

PRELIMINARY HYDROLOGIC ANALYSIS

For:

**COMPREHENSIVE PERMIT DEVELOPMENT
148 WESTON ROAD
WELLESLEY, MA**

Located:

**148 WESTON ROAD
WELLESLEY, MASSACHUSETTS**

Submitted to:
TOWN OF WELLESLEY

Prepared For:
**WELLESLEY PARK, LLC
49 COOLIDGE STREET
BROOKLINE, MASSACHUSETTS 02446**



Professional Civil Engineering • Project Management • Land Planning
150 Longwater Drive, Suite 101, Norwell, Massachusetts 02061
Tel.: (781) 792-3900 Facsimile: (781) 792-0333
www.mckeng.com

TABLE OF CONTENTS

	<u>Page</u>
1. NARRATIVE	
▪ Project Summary	1
▪ Pre-Development Condition	1
▪ Post-Development Condition	2
▪ Figure 1 (USGS Locus Map)	4
▪ Figure 2 (FEMA Flood Map)	5
▪ Figure 3 (NRCS Soils Map)	6
▪ Figure 4 (Wellhead Protection Area Map)	7
▪ Figure 5 (Wellesley Zoning Map)	8
2. APPENDICES	
▪ APPENDIX A: Pre-Development Condition	
▪ APPENDIX B: Post Development Condition	
▪ APPENDIX C – Soil Testing Data	

**Hydrologic Analysis
Comprehensive Permit Development
Wellesley Park, LLC
148 Weston Road, Wellesley, Massachusetts**

Project Summary

The project proponent Wellesley Park, LLC, proposes to redevelop a 0.83-acre parcel of land located at 148 Weston Road in Wellesley, Massachusetts. The proposed redevelopment is being permitted under MGL Ch. 40B Comprehensive Permit and will consist of 55 multi-family residential units. The proposed development will involve the construction of a five (5) story plus one (1) basement level parking building, sidewalks, outdoor patio, retaining wall, access drive, stormwater management systems, utilities and other related infrastructure.

The project is comprised of one (1) parcel which is shown as Parcel ID 149-4 on the Town of Wellesley Assessor's Map. The site is bounded by Weston Road to the northeast, developed residential property to the southeast and municipal property owned by the Town of Wellesley to the north and west as shown on Figure 1 - USGS Locus Map.

The project will access the existing utility infrastructure located on Weston Road, including sanitary sewer, water, gas, electric, telephone, and cable television. The stormwater management system will be designed to fully comply with all standards of the Department of Environment Protection's Stormwater Management Regulations and will utilize an on-site subsurface infiltration system for stormwater storage and treatment.

The existing and proposed site conditions are illustrated on the project *site plans* entitled "Proposed Comprehensive Permit Development, 148 Weston Road", prepared by McKenzie Engineering Group, Inc. dated February 15, 2018.

This report contains stormwater runoff calculations for the pre-development and post-development conditions and includes the sizing of the proposed low impact drainage system and stormwater best management practices (BMPs). All stormwater management facilities will be designed to mitigate peak rates of runoff, provide renovation of stormwater and meet the requirements of the DEP's Stormwater Management Regulations.

Pre-Development Condition

The property is located within the Single Residence 15 (SR15) Zoning District. The majority of the 0.83 acre-parcel is vacant as the single family home was recently razed.

The existing topography generally ranges in elevation from approximately 159 ft. (Wellesley Vertical Datum) in the northeast portion of the site to an elevation of approximately 146 ft. (Wellesley Vertical Datum) in the southeast portion of the site. The parcel slopes from the northeast and southeast property lines, towards a depression in the middle of the site.

Review of available environmental databases such as MassGIS reveals that the site is not located within a mapped Natural Heritage Endangered Species Area, FEMA Flood Insurance Rate Map Panel No. 25021C0016E (refer to Figure 2 - FEMA Flood Map), or a Contributing Watershed to Outstanding Resource Water (ORW).

The site is located within Wellesley College's Zone II Wellhead Protection Area, (refer to Figure 4 - Wellhead Protection Area Map) and the Town of Wellesley's Water Supply Protection District, (refer to Figure 5 - Wellesley Zoning Map).

The Natural Resources Conservation Service (NRCS) has identified the soil on the site as 254B, Merrimac Fine Sandy Loam, 3 to 8% slopes with hydrologic soil group (HSG) A, and 630C, Charlton-Hollis-Urban land complex, 3 to 15% slopes with hydrologic soil group (HSG) A. Refer to Figure 3 - NRCS Soils Map. Soil testing conducted by McKenzie Engineering Group, Inc. (MEG) on January 31, 2018 identified the soils to be sand, sandy loam and loamy sand. Refer to the soil logs in Appendix C.

The existing watershed analyzed in this report is comprised of approximately 2.60 acres which includes the subject parcel and a portion of offsite tributary areas to the northwest. The watershed consists of one (1) sub-catchment area (1S) and one (1) Design Point (DP-1). Refer to the Pre-Development Watershed Plan WS-1 in Appendix A for a delineation of drainage subcatchments for the pre-development design condition.

The SCS Technical Release 20 (TR-20) and Technical Release 55 (TR-55) method based program "HydroCAD" was employed to develop pre- and post-development peak flows. Drainage calculations were prepared for the pre-development condition for the 2, 10, 25 and 100-year, Type III storm events. Refer to Appendix A for computer results, soil characteristics, cover descriptions and times of concentrations for all subareas.

The peak rates of runoff and elevations for this condition are as follows:

Table 1 – Pre-Development Results

	Design Storm (flow in cfs)			
	2-Year Storm	10-Year Storm	25-Year Storm	100-Year Storm
Design Point	Flow (CFS)	Flow (CFS)	Flow (CFS)	Flow (CFS)
DP-1	0.00	0.03	0.10	0.51

	Design Storm (volume in ac-ft)			
	2-Year Storm	10-Year Storm	25-Year Storm	100-Year Storm
Design Point	Volume (AC-FT)	Volume (AC-FT)	Volume (AC-FT)	Volume (AC-FT)
DP-1	0.00	0.020	0.05	0.116

Post-Development Condition

148 Weston Road residences is proposed as a 55-unit redevelopment to be permitted in accordance with Massachusetts General Laws 40B § 20-23. The project consists of the construction of a five (5) story plus one (1) basement level parking building, sidewalks, outdoor patio, retaining wall, access drive, stormwater management systems, utilities and other related infrastructure.

The project will access the existing utility infrastructure located on Weston Road, including sanitary sewer, water, gas, electric, telephone, and cable television. The stormwater management system will be designed to fully comply with all standards of the Department of

Environment Protection's Stormwater Management Regulations and will utilize an on-site subsurface infiltration system for stormwater storage and treatment.

Watershed areas were analyzed in the post-development condition to design low impact stormwater management facilities to mitigate impacts resulting from redeveloping the property. The objective in designing the proposed drainage facilities for the project was to maintain existing drainage patterns to the extent practicable and to ensure that the post-development rates of runoff are less than pre-development rates at the design point. Refer to the Post-Development Watershed Plan WS-2 in Appendix B for a delineation of post-development drainage subareas. The design point for the post-development design conditions correspond to those analyzed for the pre-development design condition.

The subsurface infiltration chamber system was designed to accommodate peak flow generated by all storms up to the 100-year storm event. Refer to site plans for the drainage system design. All BMPs shall be supported by a comprehensive Construction Phase Pollution Prevention and Erosion Control Plan and Post-Development BMP Operation and Maintenance Plan.

Parking areas will be contained within the building and will drain to oil/sediment traps prior to discharge into the municipal sewer system, as required. The site will be designed to comply with the Stormwater Management Regulations to the extent practicable as required under Standards 6 and 7 for a redevelopment project.

The peak rates of runoff and elevations for this condition are as follows:

Table 2 – Post-Development Results				
	Design Storm (flow in cfs)			
	2-Year Storm	10-Year Storm	25-Year Storm	100-Year Storm
Design Point	Flow (CFS)	Flow (CFS)	Flow (CFS)	Flow (CFS)
DP-1	0.00	0.03	0.10	0.43

	Design Storm (volume in ac-ft)			
	2-Year Storm	10-Year Storm	25-Year Storm	100-Year Storm
Design Point	Volume (AC-FT)	Volume (AC-FT)	Volume (AC-FT)	Volume (AC-FT)
DP-1	0.00	0.017	0.040	0.090

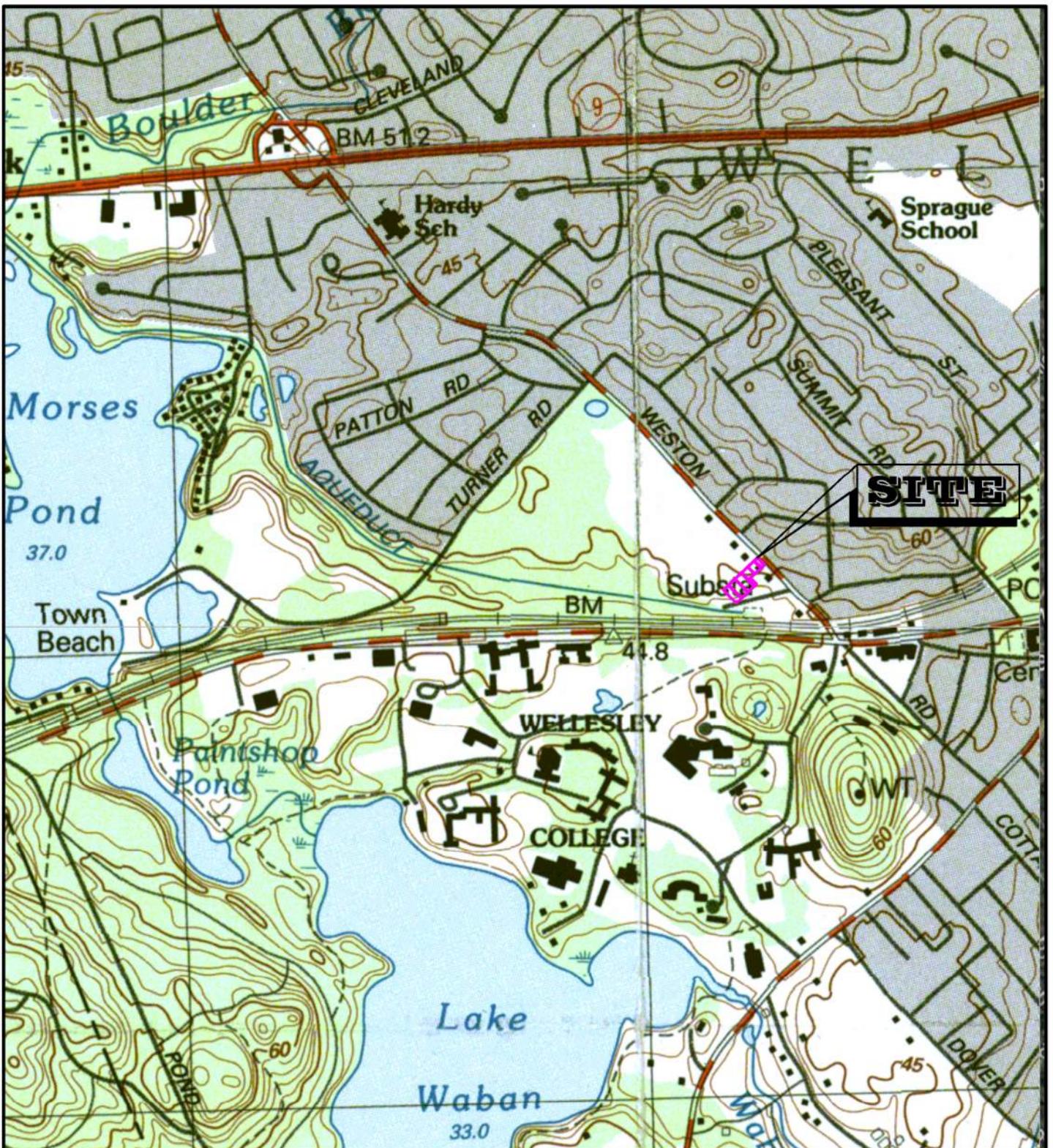


FIGURE - 1



U.S. GEOLOGICAL SURVEY
7.5 X 15 MINUTE SERIES



Assinippi Office Park
150 Longwater Drive, Suite 101
Norwell, MA 02061
781.792.3900
www.mckeng.com

USGS LOCUS MAP

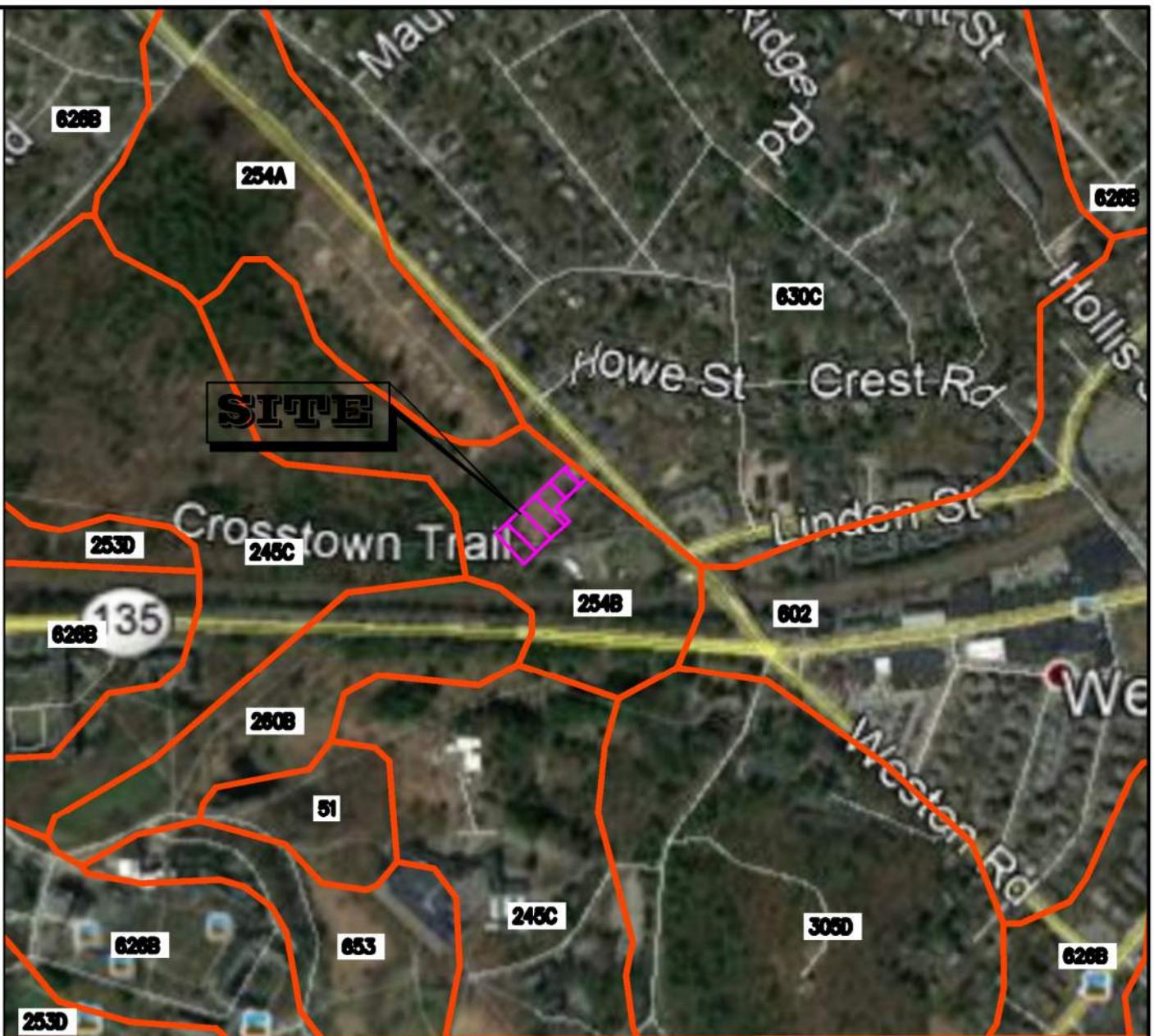
148 WESTON ROAD
PARCEL 149-4
WELLESLEY, MASSACHUSETTS



Assinippi Office Park
150 Longwater Drive, Suite 101
Norwell, MA 02061
781.792.3900
www.mckeng.com

FEMA FLOOD MAP

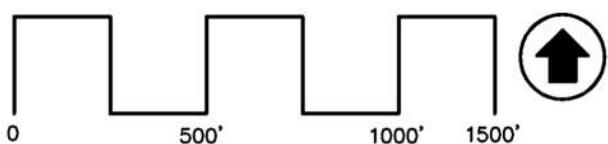
148 WESTON ROAD
PARCEL 149-4
WELLESLEY, MASSACHUSETTS



SOIL KEY

SOIL CLASSIFICATION	DESCRIPTION	HYDROLOGIC SOIL GROUP
254B	MERRIMAC FINE SANDY LOAM, 3-8 PERCENT SLOPES	A
630C	CHARLTON-HOLLIS-URBAN LAND COMPLEX, 3-15 PERCENT SLOPES	A

FIGURE - 3



NRCS SOIL SURVEY
PLYMOUTH COUNTY



Assinippi Office Park
150 Longwater Drive, Suite 101
Norwell, MA 02061
781.792.3900
www.mckeng.com

NRCS SOILS MAP

148 WESTON ROAD
PARCEL 149-4
WELLESLEY, MASSACHUSETTS

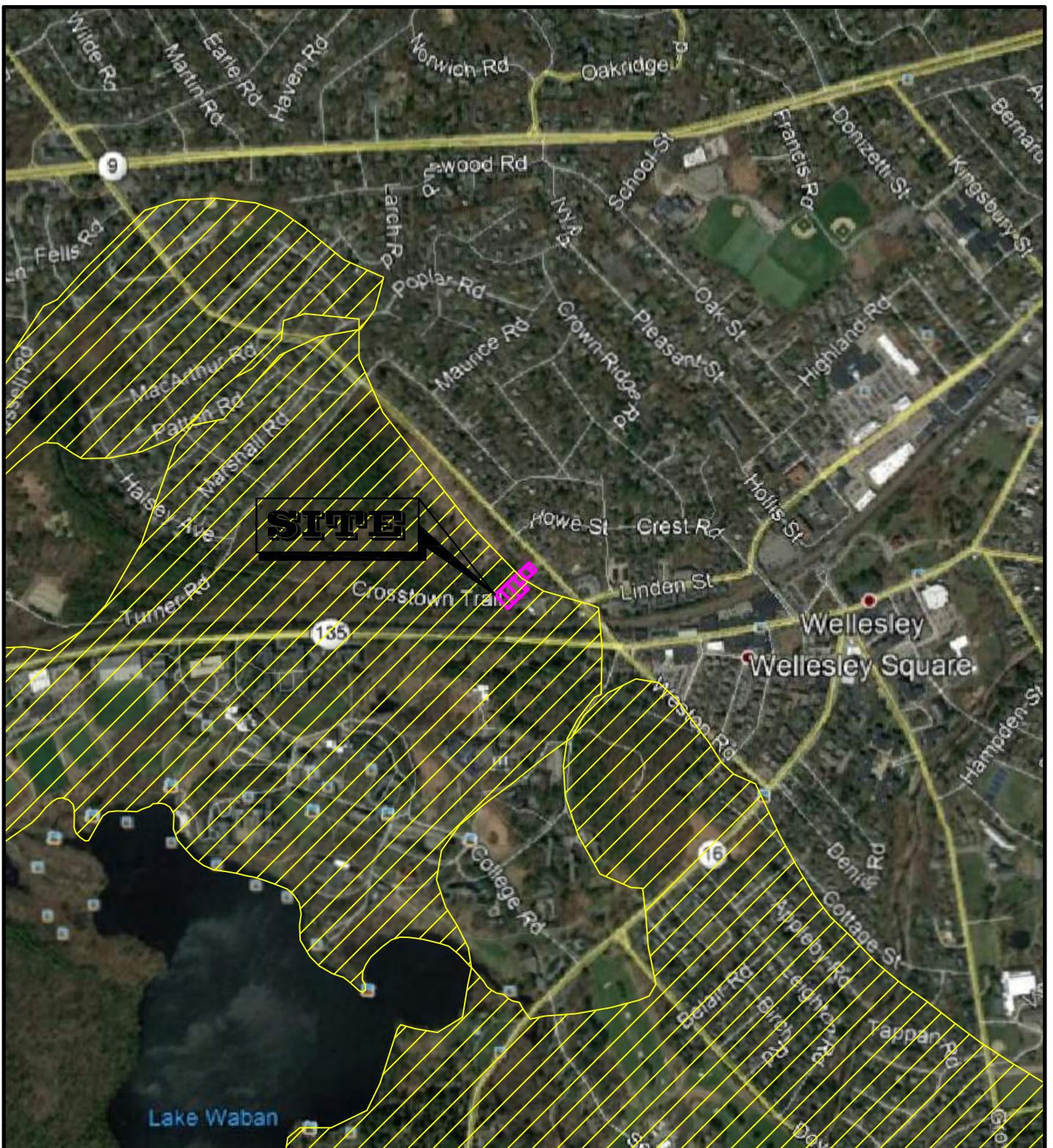
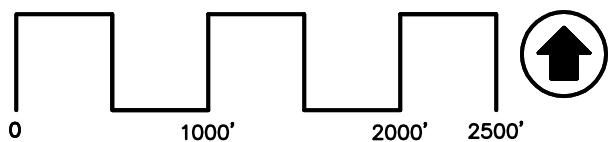


FIGURE - 4



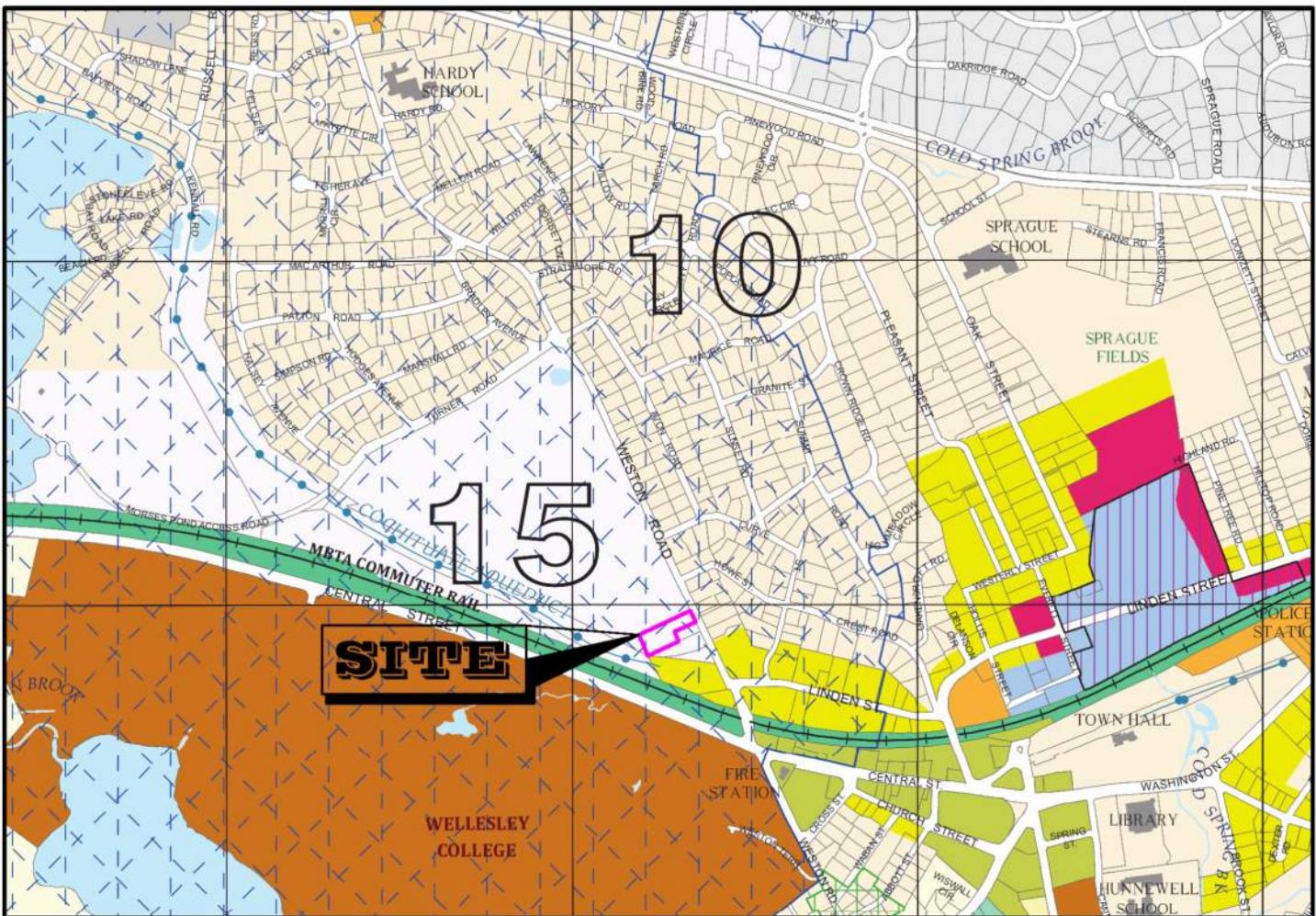
MASSDEP WELLHEAD PROTECTION
AREA (ZONE II)



Assinippi Office Park
150 Longwater Drive, Suite 101
Norwell, MA 02061
781.792.3900
www.mckeng.com

WELLHEAD PROTECTION AREA MAP

148 WESTON ROAD
PARCEL 149-4
WELLESLEY, MASSACHUSETTS



Single Residence A

Multi-Family Residence

Town House

General Residence

Limited Residence

Limited Apartment

Educational

Educational A

Educational B

Administrative/Professional

Limited Business

Business

Business A

Industrial

Industrial A

Transportation

Conservation

Lower Falls Village Commercial District

Wellesley Square Commercial District

Single Residence 10

Single Residence 15

Single Residence 20

Single Residence 30

Single Residence 40

Historic District

Residential Incentive Overlay District

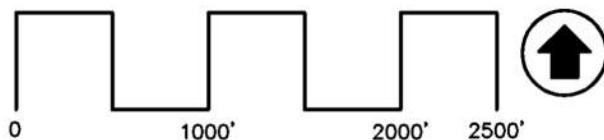
Water Supply Protection District

Linden Street Corridor Overlay District

Note:

Refer to flood plain maps
and watershed protection
maps for adopted flood
plain and watershed
protection districts.

FIGURE - 5



TOWN OF WELLESLEY
ZONING MAP



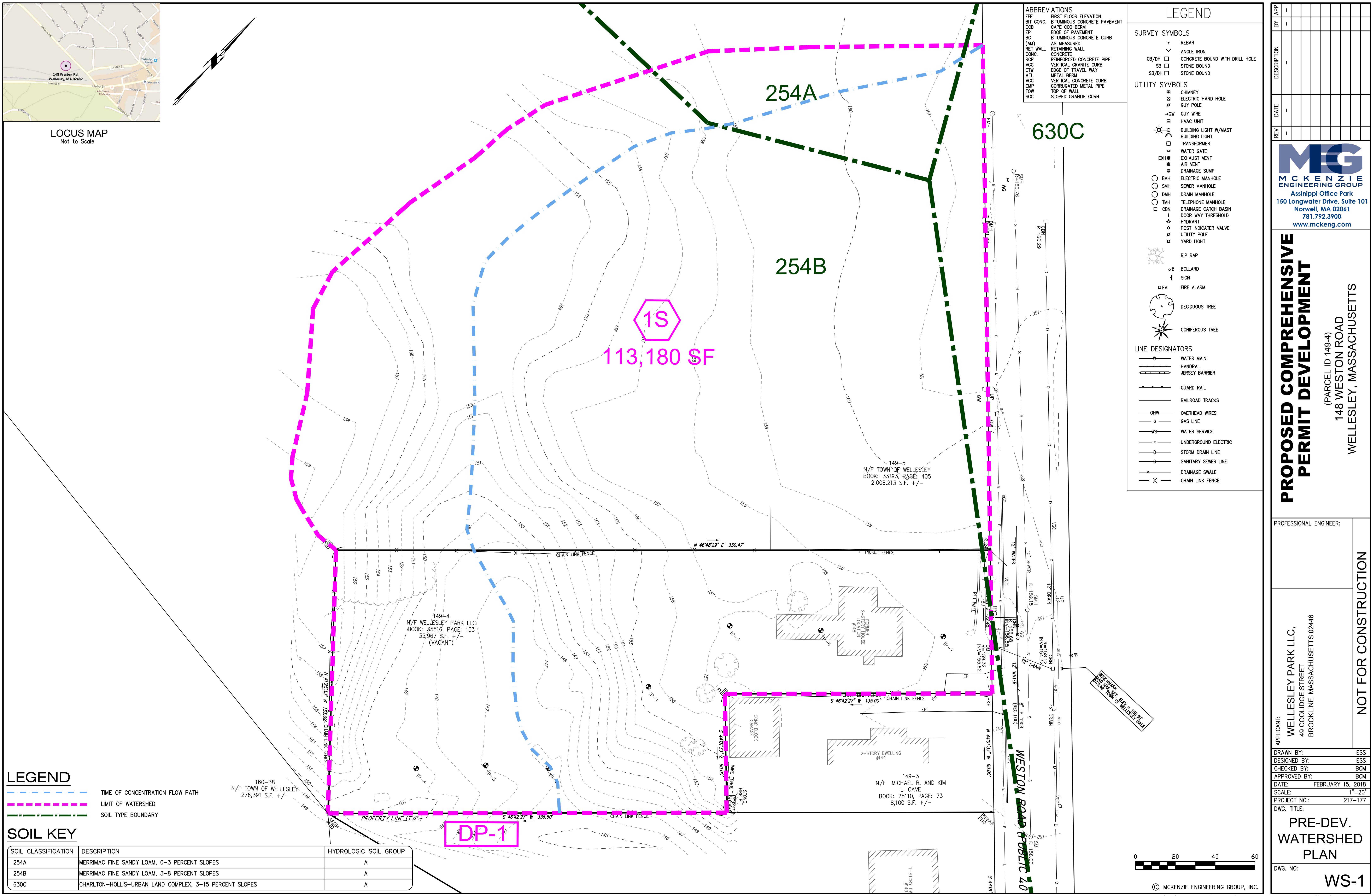
Assinippi Office Park
150 Longwater Drive, Suite 101
Norwell, MA 02061
781.792.3900
www.mckeng.com

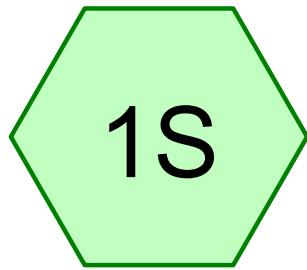
WELLESLEY ZONING MAP

148 WESTON ROAD
PARCEL 149-4
WELLESLEY, MASSACHUSETTS

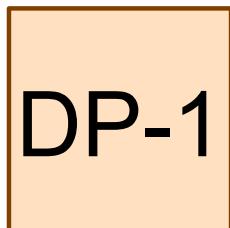
APPENDIX A

Pre-Development Condition

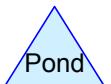




1S



PROPERTY LINE



Routing Diagram for 217-177 Pre Development
Prepared by McKenzie Engineering Group, Inc.
HydroCAD® 10.00-14 s/n 00452 © 2015 HydroCAD Software Solutions LLC

217-177 Pre Development

Prepared by McKenzie Engineering Group, Inc.

HydroCAD® 10.00-14 s/n 00452 © 2015 HydroCAD Software Solutions LLC

Page 2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.303	39	>75% Grass cover, Good, HSG A (1S)
0.134	96	Gravel surface, HSG A (1S)
0.014	98	Paved parking, HSG A (1S)
0.065	98	Roofs, HSG A (1S)
2.082	30	Woods, Good, HSG A (1S)
2.598	37	TOTAL AREA

217-177 Pre Development

Prepared by McKenzie Engineering Group, Inc.

HydroCAD® 10.00-14 s/n 00452 © 2015 HydroCAD Software Solutions LLC

Page 3**Soil Listing (all nodes)**

Area (acres)	Soil Group	Subcatchment Numbers
2.598	HSG A	1S
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.000	Other	
2.598		TOTAL AREA

217-177 Pre Development

Prepared by McKenzie Engineering Group, Inc.

HydroCAD® 10.00-14 s/n 00452 © 2015 HydroCAD Software Solutions LLC

Page 4

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.303	0.000	0.000	0.000	0.000	0.303	>75% Grass cover, Good	1S
0.134	0.000	0.000	0.000	0.000	0.134	Gravel surface	1S
0.014	0.000	0.000	0.000	0.000	0.014	Paved parking	1S
0.065	0.000	0.000	0.000	0.000	0.065	Roofs	1S
2.082	0.000	0.000	0.000	0.000	2.082	Woods, Good	1S
2.598	0.000	0.000	0.000	0.000	2.598	TOTAL AREA	

217-177 Pre Development*Type III 24-hr 100-Year Rainfall=6.70"*

Prepared by McKenzie Engineering Group, Inc.

HydroCAD® 10.00-14 s/n 00452 © 2015 HydroCAD Software Solutions LLC

Page 5

Time span=5.00-48.00 hrs, dt=0.05 hrs, 861 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: 1S

Runoff Area=113,164 sf 3.05% Impervious Runoff Depth=0.53"
Flow Length=557' Tc=17.2 min CN=37 Runoff=0.51 cfs 0.116 af

Reach DP-1: PROPERTYLINE

Inflow=0.51 cfs 0.116 af
Outflow=0.51 cfs 0.116 af

Total Runoff Area = 2.598 ac Runoff Volume = 0.116 af Average Runoff Depth = 0.53"
96.95% Pervious = 2.519 ac 3.05% Impervious = 0.079 ac

217-177 Pre Development

Type III 24-hr 100-Year Rainfall=6.70"

Prepared by McKenzie Engineering Group, Inc.

HydroCAD® 10.00-14 s/n 00452 © 2015 HydroCAD Software Solutions LLC

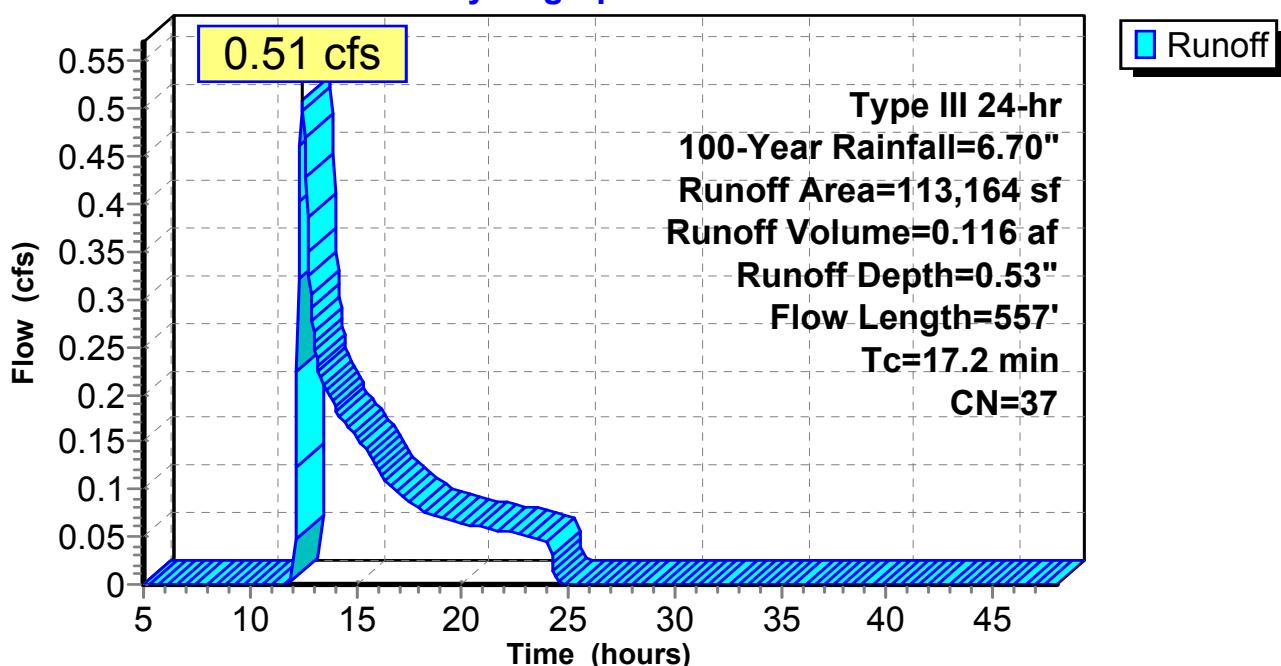
Page 6

Summary for Subcatchment 1S: 1S

Runoff = 0.51 cfs @ 12.50 hrs, Volume= 0.116 af, Depth= 0.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.70"

Area (sf)	CN	Description		
13,180	39	>75% Grass cover, Good, HSG A		
90,694	30	Woods, Good, HSG A		
630	98	Paved parking, HSG A		
2,816	98	Roofs, HSG A		
5,844	96	Gravel surface, HSG A		
113,164	37	Weighted Average		
109,718		96.95% Pervious Area		
3,446		3.05% Impervious Area		
Tc (min)	Length (feet)	Slope (ft/ft) Velocity (ft/sec) Capacity (cfs) Description		
13.8	50	0.0150	0.06	Sheet Flow, SHEET FLOW Woods: Light underbrush n= 0.400 P2= 3.20"
3.4	507	0.0236	2.47	Shallow Concentrated Flow, SHALLOW CONC. FLOW Unpaved Kv= 16.1 fps
17.2	557	Total		

Subcatchment 1S: 1S**Hydrograph**

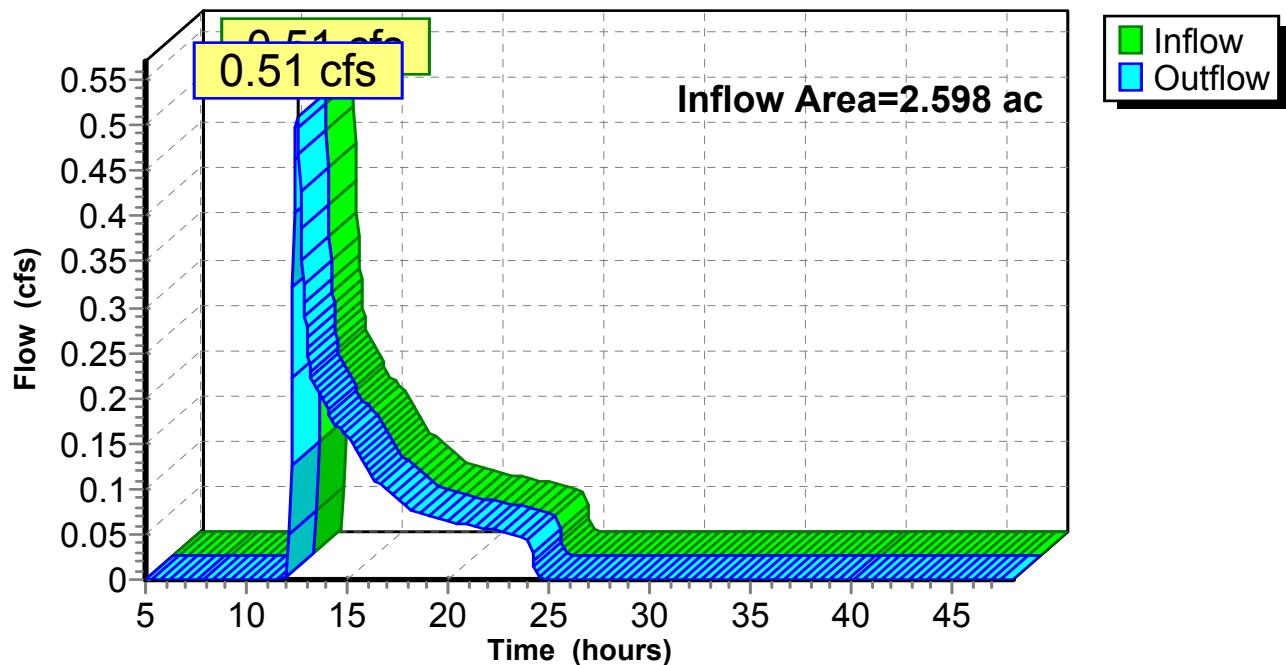
Summary for Reach DP-1: PROPERTY LINE

Inflow Area = 2.598 ac, 3.05% Impervious, Inflow Depth = 0.53" for 100-Year event

Inflow = 0.51 cfs @ 12.50 hrs, Volume= 0.116 af

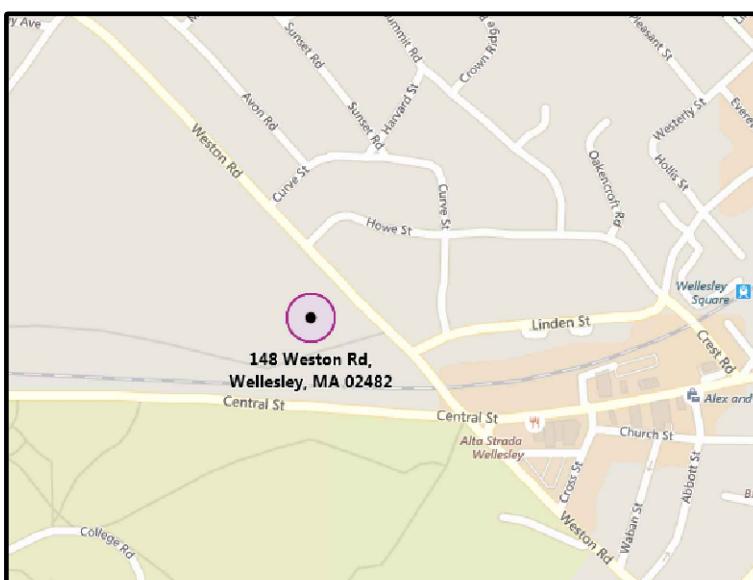
Outflow = 0.51 cfs @ 12.50 hrs, Volume= 0.116 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

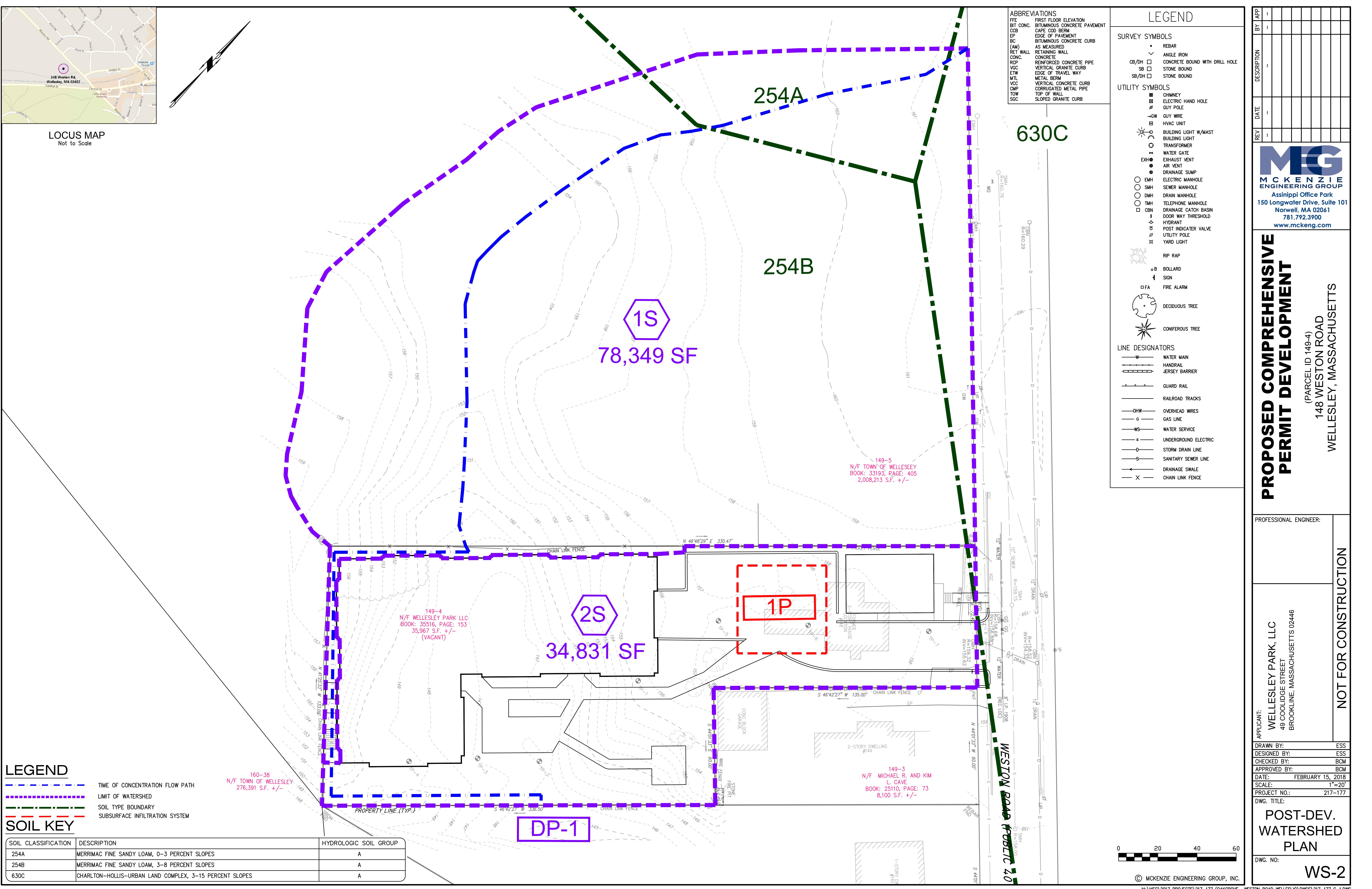
Reach DP-1: PROPERTY LINE**Hydrograph**

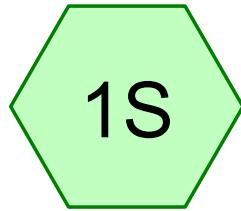
A P P E N D I X B

Post-Development Condition



LOCUS MAP
Not to Scale





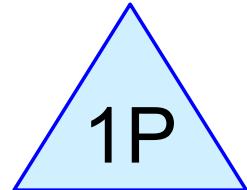
1S



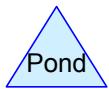
2S



PROPERTY LINE



Subsurface infiltration
chambers



Routing Diagram for 217-177 Post Development Final
Prepared by McKenzie Engineering Group, Inc.
HydroCAD® 10.00-14 s/n 00452 © 2015 HydroCAD Software Solutions LLC

217-177 Post Development Final

Prepared by McKenzie Engineering Group, Inc.

HydroCAD® 10.00-14 s/n 00452 © 2015 HydroCAD Software Solutions LLC

Page 2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.181	39	>75% Grass cover, Good, HSG A (2S)
0.204	39	>75% Grass cover, Good, HSG A (Offsite) (1S)
0.004	98	Concrete stairs, HSG A (1S)
0.031	98	Concrete walk, HSG A (2S)
0.031	96	Gravel surface, HSG A (1S)
0.116	96	Gravel surface, HSG A (Offsite) (1S)
0.148	98	Paved parking, HSG A (2S)
0.051	64	Permeable pavers, HSG A (2S)
0.056	39	Planters, HSG A (2S)
0.326	98	Roofs, HSG A (2S)
0.040	98	Roofs, HSG A (Offsite) (1S)
0.006	98	Wall, HSG A (2S)
1.404	30	Woods, Good, HSG A (Offsite) (1S)
2.598	50	TOTAL AREA

217-177 Post Development Final

Prepared by McKenzie Engineering Group, Inc.

HydroCAD® 10.00-14 s/n 00452 © 2015 HydroCAD Software Solutions LLC

Page 3**Soil Listing (all nodes)**

Area (acres)	Soil Group	Subcatchment Numbers
2.598	HSG A	1S, 2S
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.000	Other	
2.598		TOTAL AREA

217-177 Post Development Final

Prepared by McKenzie Engineering Group, Inc.

HydroCAD® 10.00-14 s/n 00452 © 2015 HydroCAD Software Solutions LLC

Page 4

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.385	0.000	0.000	0.000	0.000	0.385	>75% Grass cover, Good	1S, 2S
0.004	0.000	0.000	0.000	0.000	0.004	Concrete stairs	1S
0.031	0.000	0.000	0.000	0.000	0.031	Concrete walk	2S
0.147	0.000	0.000	0.000	0.000	0.147	Gravel surface	1S
0.148	0.000	0.000	0.000	0.000	0.148	Paved parking	2S
0.051	0.000	0.000	0.000	0.000	0.051	Permeable pavers	2S
0.056	0.000	0.000	0.000	0.000	0.056	Planters	2S
0.366	0.000	0.000	0.000	0.000	0.366	Roofs	1S, 2S
0.006	0.000	0.000	0.000	0.000	0.006	Wall	2S
1.404	0.000	0.000	0.000	0.000	1.404	Woods, Good	1S
2.598	0.000	0.000	0.000	0.000	2.598	TOTAL AREA	

217-177 Post Development Final

Prepared by McKenzie Engineering Group, Inc.

HydroCAD® 10.00-14 s/n 00452 © 2015 HydroCAD Software Solutions LLC

Page 5

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	1S	0.00	0.00	297.0	0.0050	0.012	12.0	0.0	0.0

217-177 Post Development Final*Type III 24-hr 2-Year Rainfall=3.20"*

Prepared by McKenzie Engineering Group, Inc.

HydroCAD® 10.00-14 s/n 00452 © 2015 HydroCAD Software Solutions LLC

Page 6

Time span=5.00-48.00 hrs, dt=0.05 hrs, 861 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: 1SRunoff Area=78,349 sf 2.46% Impervious Runoff Depth=0.00"
Flow Length=650' Tc=17.3 min CN=38 Runoff=0.00 cfs 0.000 af**Subcatchment2S: 2S**Runoff Area=34,831 sf 63.83% Impervious Runoff Depth=1.27"
Tc=6.0 min CN=78 Runoff=1.15 cfs 0.085 af**Reach DP-1: PROPERTY LINE**Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af**Pond 1P: Subsurface infiltration chambers**Peak Elev=153.50' Storage=581 cf Inflow=1.15 cfs 0.085 af
Outflow=0.39 cfs 0.085 af**Total Runoff Area = 2.598 ac Runoff Volume = 0.085 af Average Runoff Depth = 0.39"**
78.65% Pervious = 2.044 ac 21.35% Impervious = 0.555 ac

217-177 Post Development Final

Type III 24-hr 2-Year Rainfall=3.20"

Prepared by McKenzie Engineering Group, Inc.

HydroCAD® 10.00-14 s/n 00452 © 2015 HydroCAD Software Solutions LLC

Page 7

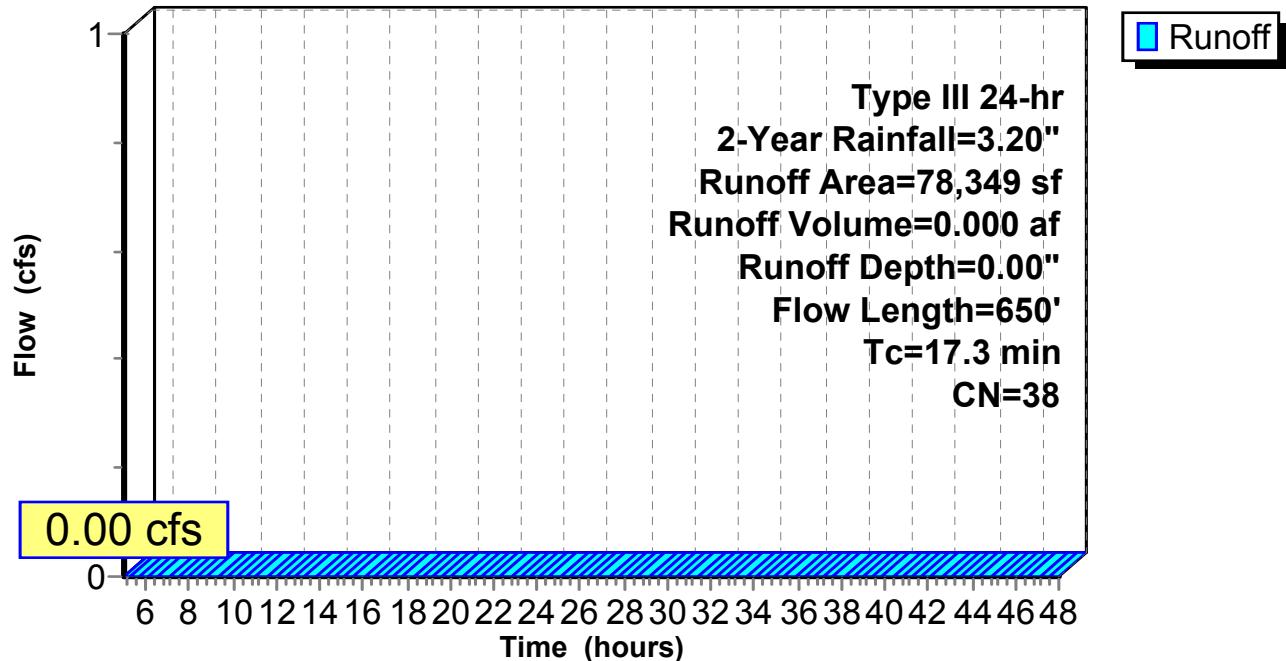
Summary for Subcatchment 1S: 1S

Runoff = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
*	61,141	30 Woods, Good, HSG A (Offsite)
*	5,064	96 Gravel surface, HSG A (Offsite)
*	8,886	39 >75% Grass cover, Good, HSG A (Offsite)
*	1,742	98 Roofs, HSG A (Offsite)
	1,332	96 Gravel surface, HSG A
*	184	98 Concrete stairs, HSG A
78,349	38	Weighted Average
76,423		97.54% Pervious Area
1,926		2.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	50	0.0150	0.06		Sheet Flow, SHEET FLOW Woods: Light underbrush n= 0.400 P2= 3.20"
2.1	303	0.0230	2.44		Shallow Concentrated Flow, SHALLOW CONC. FLOW Unpaved Kv= 16.1 fps
1.4	297	0.0050	3.47	2.73	Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
17.3	650	Total			

Subcatchment 1S: 1S**Hydrograph**

Summary for Subcatchment 2S: 2S

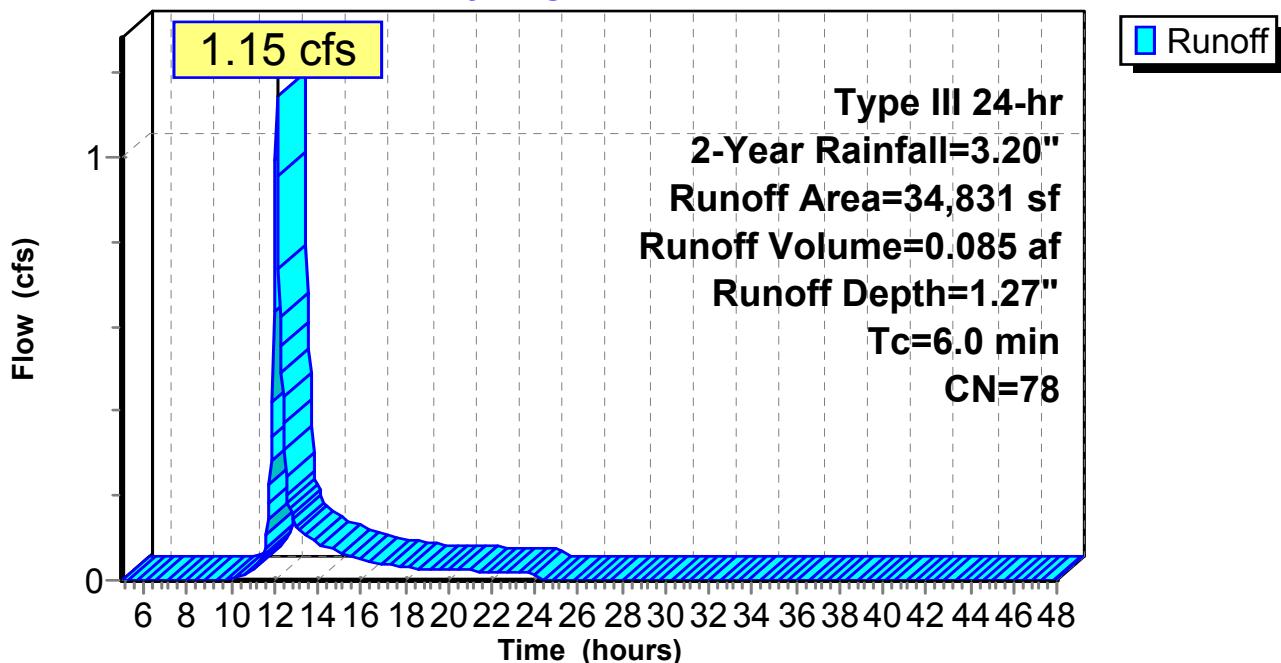
Runoff = 1.15 cfs @ 12.10 hrs, Volume= 0.085 af, Depth= 1.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description			
7,900	39	>75% Grass cover, Good, HSG A			
6,431	98	Paved parking, HSG A			
14,221	98	Roofs, HSG A			
*	252	Wall, HSG A			
*	1,329	Concrete walk, HSG A			
*	2,243	Permeable pavers, HSG A			
*	2,455	Planters, HSG A			
34,831	78	Weighted Average			
12,598		36.17% Pervious Area			
22,233		63.83% Impervious Area			
Tc	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 2S: 2S

Hydrograph



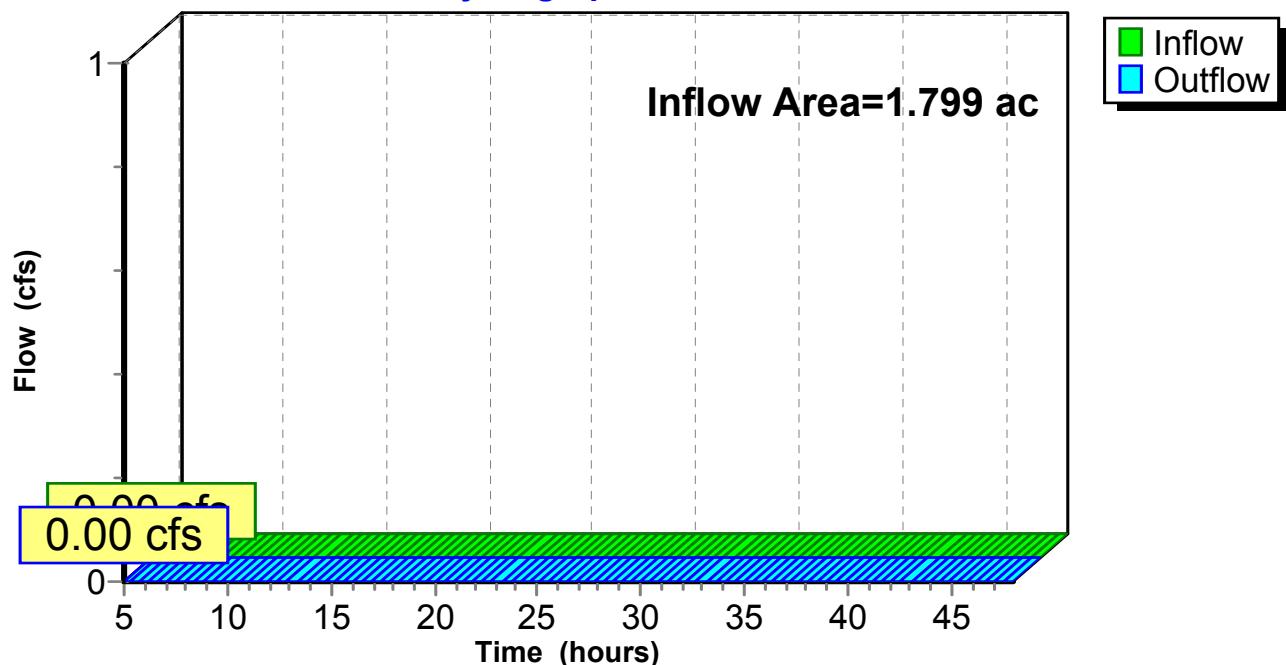
Summary for Reach DP-1: PROPERTY LINE

Inflow Area = 1.799 ac, 2.46% Impervious, Inflow Depth = 0.00" for 2-Year event

Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-1: PROPERTY LINE**Hydrograph**

Summary for Pond 1P: Subsurface infiltration chambers

Inflow Area = 0.800 ac, 63.83% Impervious, Inflow Depth = 1.27" for 2-Year event
 Inflow = 1.15 cfs @ 12.10 hrs, Volume= 0.085 af
 Outflow = 0.39 cfs @ 12.00 hrs, Volume= 0.085 af, Atten= 66%, Lag= 0.0 min
 Discarded = 0.39 cfs @ 12.00 hrs, Volume= 0.085 af

Routing by Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 153.50' @ 12.43 hrs Surf.Area= 2,048 sf Storage= 581 cf

Plug-Flow detention time= 7.7 min calculated for 0.085 af (100% of inflow)
 Center-of-Mass det. time= 7.7 min (856.9 - 849.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	152.90'	1,734 cf	45.00'W x 45.50'L x 3.54'H Field A 7,252 cf Overall - 2,917 cf Embedded = 4,334 cf x 40.0% Voids
#2A	153.40'	2,917 cf	Cultec R-330XLHD x 54 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 9 rows
4,651 cf			Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	152.90'	8.270 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.39 cfs @ 12.00 hrs HW=152.97' (Free Discharge)
 ↑ 1=Exfiltration (Exfiltration Controls 0.39 cfs)

Pond 1P: Subsurface infiltration chambers - Chamber Wizard Field A**Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)**

Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf

Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap

Row Length Adjustment= +1.50' x 7.45 sf x 9 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

6 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 43.50' Row Length +12.0" End Stone x 2 = 45.50' Base Length

9 Rows x 52.0" Wide + 6.0" Spacing x 8 + 12.0" Side Stone x 2 = 45.00' Base Width

6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

54 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 9 Rows = 2,917.1 cf Chamber Storage

7,251.6 cf Field - 2,917.1 cf Chambers = 4,334.5 cf Stone x 40.0% Voids = 1,733.8 cf Stone Storage

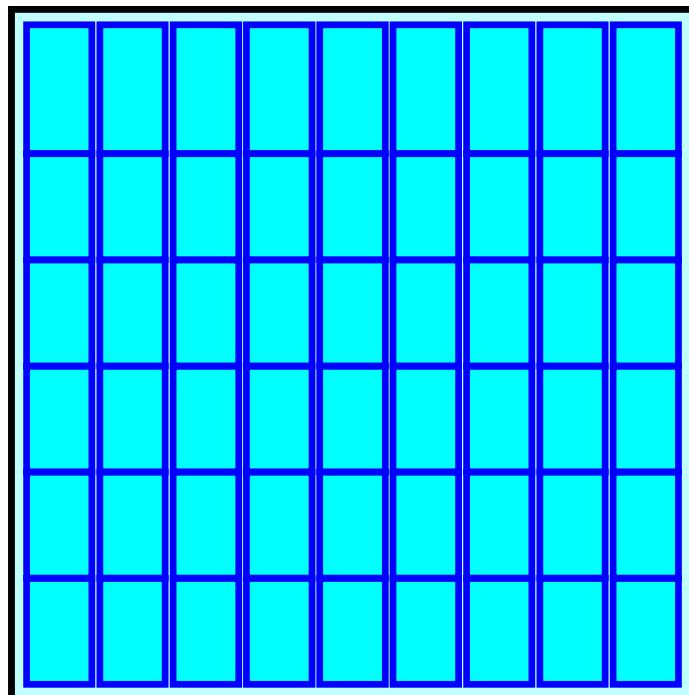
Chamber Storage + Stone Storage = 4,650.9 cf = 0.107 af

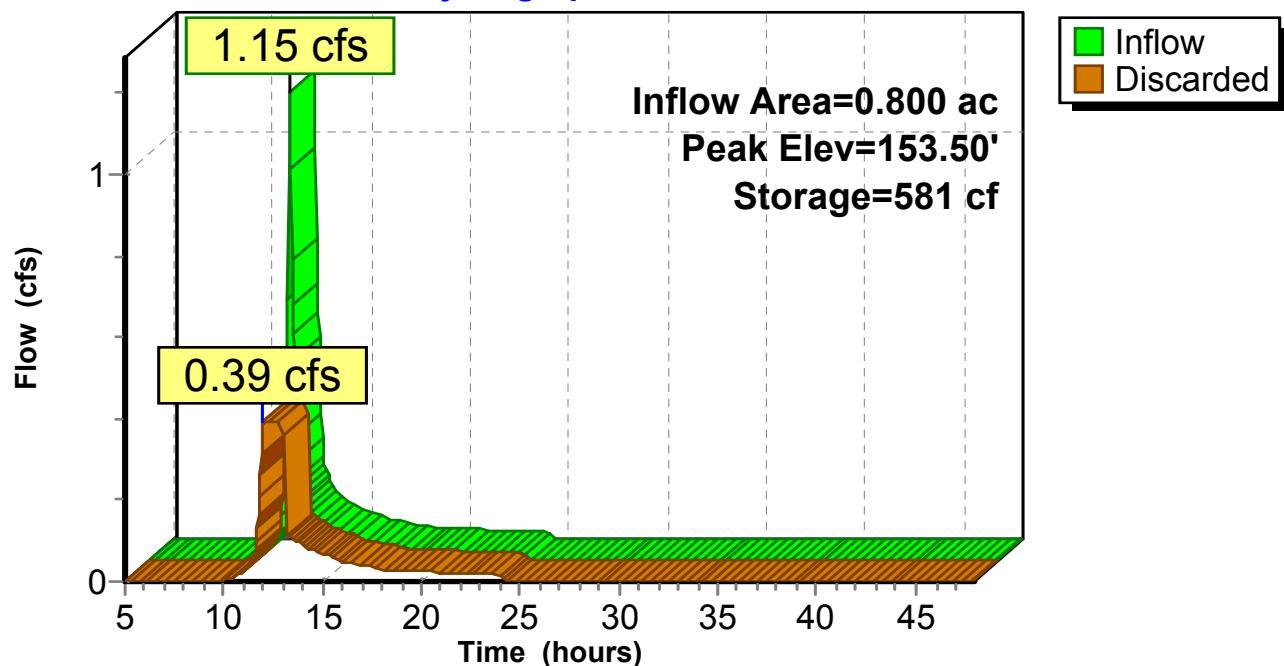
Overall Storage Efficiency = 64.1%

54 Chambers

268.6 cy Field

160.5 cy Stone



Pond 1P: Subsurface infiltration chambers**Hydrograph**

217-177 Post Development Final

Prepared by McKenzie Engineering Group, Inc.

HydroCAD® 10.00-14 s/n 00452 © 2015 HydroCAD Software Solutions LLC

Type III 24-hr 10-Year Rainfall=4.70"

Page 14

Time span=5.00-48.00 hrs, dt=0.05 hrs, 861 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: 1SRunoff Area=78,349 sf 2.46% Impervious Runoff Depth=0.12"
Flow Length=650' Tc=17.3 min CN=38 Runoff=0.03 cfs 0.017 af**Subcatchment2S: 2S**Runoff Area=34,831 sf 63.83% Impervious Runoff Depth=2.46"
Tc=6.0 min CN=78 Runoff=2.26 cfs 0.164 af**Reach DP-1: PROPERTY LINE**Inflow=0.03 cfs 0.017 af
Outflow=0.03 cfs 0.017 af**Pond 1P: Subsurface infiltration chambers** Peak Elev=154.33' Storage=2,007 cf Inflow=2.26 cfs 0.164 af
Outflow=0.39 cfs 0.164 af**Total Runoff Area = 2.598 ac Runoff Volume = 0.181 af Average Runoff Depth = 0.84"**
78.65% Pervious = 2.044 ac 21.35% Impervious = 0.555 ac

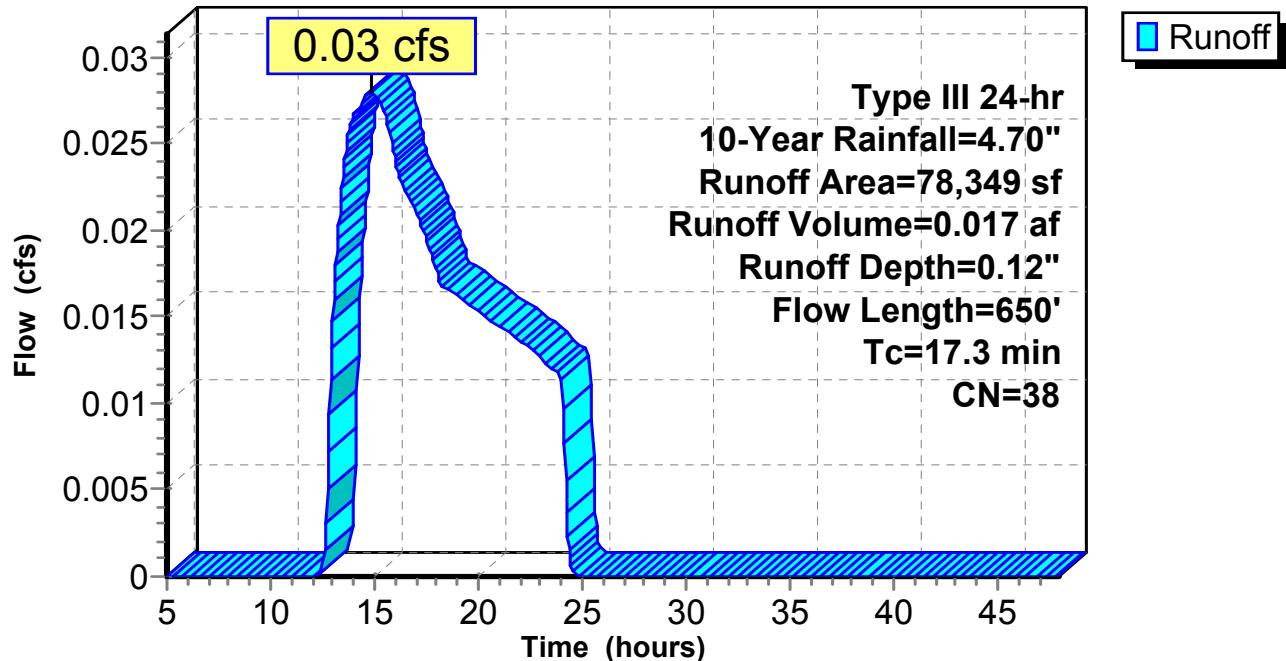
Summary for Subcatchment 1S: 1S

Runoff = 0.03 cfs @ 14.87 hrs, Volume= 0.017 af, Depth= 0.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.70"

Area (sf)	CN	Description
*	61,141	30 Woods, Good, HSG A (Offsite)
*	5,064	96 Gravel surface, HSG A (Offsite)
*	8,886	39 >75% Grass cover, Good, HSG A (Offsite)
*	1,742	98 Roofs, HSG A (Offsite)
	1,332	96 Gravel surface, HSG A
*	184	98 Concrete stairs, HSG A
78,349	38	Weighted Average
76,423		97.54% Pervious Area
1,926		2.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	50	0.0150	0.06		Sheet Flow, SHEET FLOW Woods: Light underbrush n= 0.400 P2= 3.20"
2.1	303	0.0230	2.44		Shallow Concentrated Flow, SHALLOW CONC. FLOW Unpaved Kv= 16.1 fps
1.4	297	0.0050	3.47	2.73	Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
17.3	650	Total			

Subcatchment 1S: 1S**Hydrograph**

Summary for Subcatchment 2S: 2S

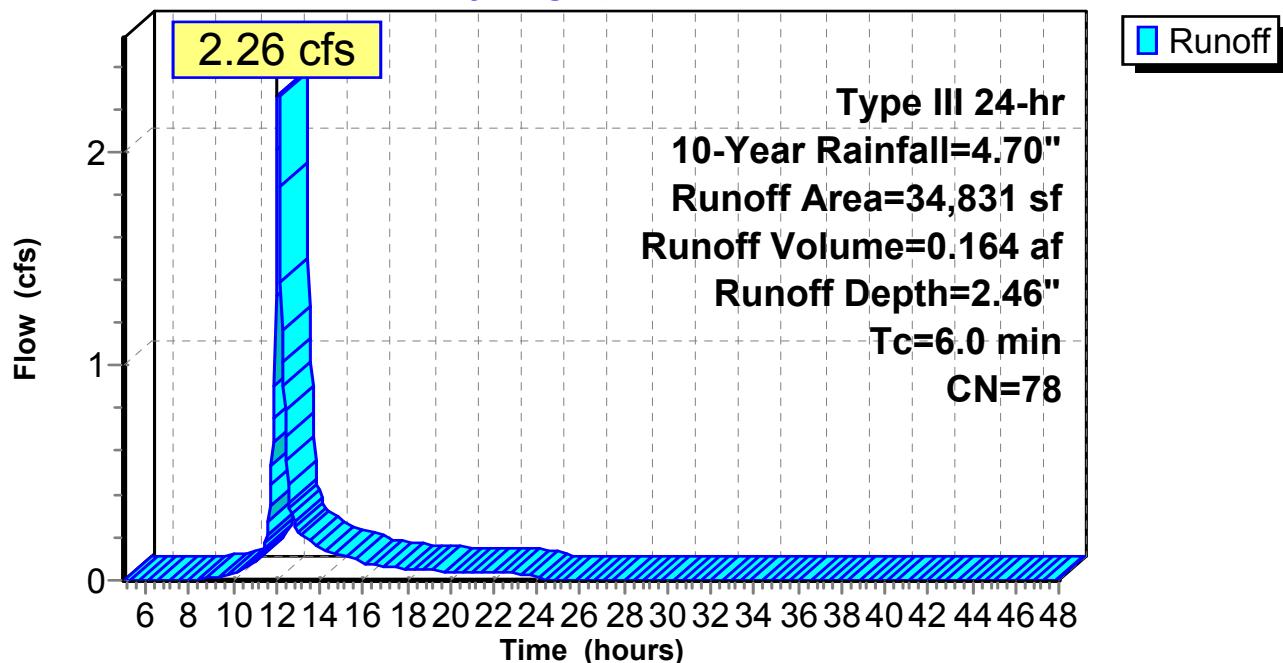
Runoff = 2.26 cfs @ 12.09 hrs, Volume= 0.164 af, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.70"

Area (sf)	CN	Description			
7,900	39	>75% Grass cover, Good, HSG A			
6,431	98	Paved parking, HSG A			
14,221	98	Roofs, HSG A			
*	252	Wall, HSG A			
*	1,329	Concrete walk, HSG A			
*	2,243	Permeable pavers, HSG A			
*	2,455	Planters, HSG A			
34,831	78	Weighted Average			
12,598		36.17% Pervious Area			
22,233		63.83% Impervious Area			
Tc	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 2S: 2S

Hydrograph



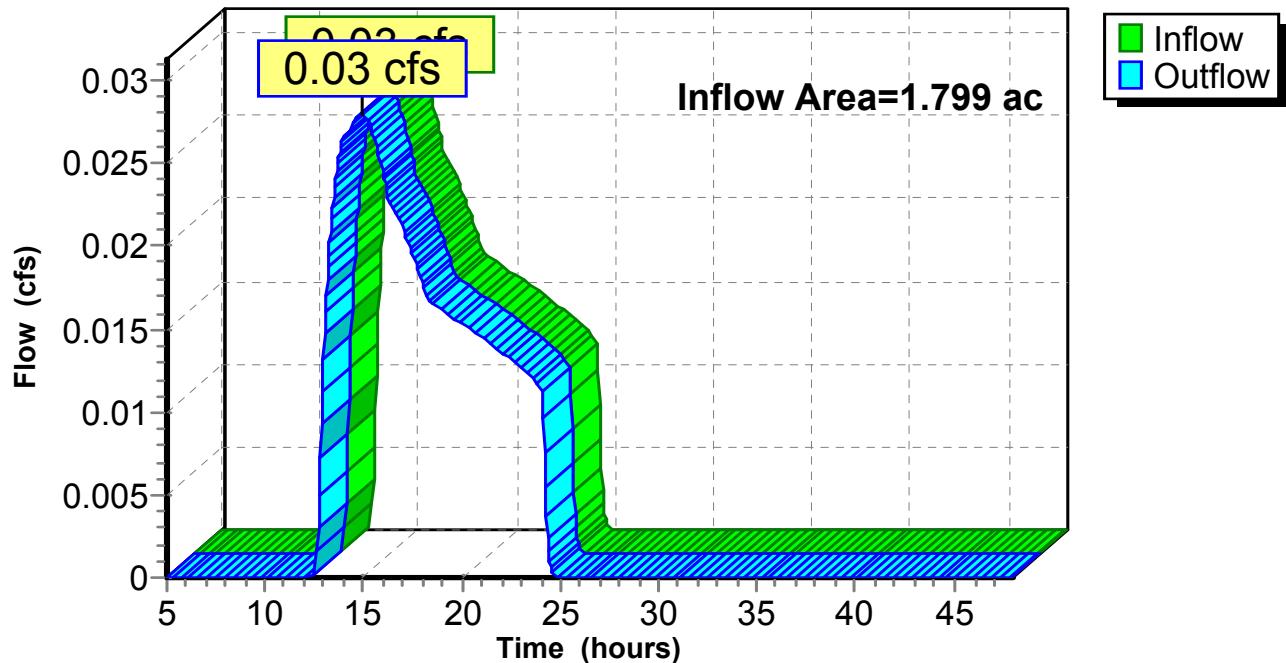
Summary for Reach DP-1: PROPERTY LINE

Inflow Area = 1.799 ac, 2.46% Impervious, Inflow Depth = 0.12" for 10-Year event
 Inflow = 0.03 cfs @ 14.87 hrs, Volume= 0.017 af
 Outflow = 0.03 cfs @ 14.87 hrs, Volume= 0.017 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-1: PROPERTY LINE

Hydrograph



Summary for Pond 1P: Subsurface infiltration chambers

Inflow Area = 0.800 ac, 63.83% Impervious, Inflow Depth = 2.46" for 10-Year event
 Inflow = 2.26 cfs @ 12.09 hrs, Volume= 0.164 af
 Outflow = 0.39 cfs @ 11.75 hrs, Volume= 0.164 af, Atten= 83%, Lag= 0.0 min
 Discarded = 0.39 cfs @ 11.75 hrs, Volume= 0.164 af

Routing by Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 154.33' @ 12.59 hrs Surf.Area= 2,048 sf Storage= 2,007 cf

Plug-Flow detention time= 33.2 min calculated for 0.164 af (100% of inflow)
 Center-of-Mass det. time= 33.2 min (863.1 - 829.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	152.90'	1,734 cf	45.00'W x 45.50'L x 3.54'H Field A 7,252 cf Overall - 2,917 cf Embedded = 4,334 cf x 40.0% Voids
#2A	153.40'	2,917 cf	Cultec R-330XLHD x 54 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 9 rows
4,651 cf			Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	152.90'	8.270 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.39 cfs @ 11.75 hrs HW=152.94' (Free Discharge)
 ↑ 1=Exfiltration (Exfiltration Controls 0.39 cfs)

Pond 1P: Subsurface infiltration chambers - Chamber Wizard Field A**Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)**

Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf

Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap

Row Length Adjustment= +1.50' x 7.45 sf x 9 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

6 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 43.50' Row Length +12.0" End Stone x 2 = 45.50'
Base Length

9 Rows x 52.0" Wide + 6.0" Spacing x 8 + 12.0" Side Stone x 2 = 45.00' Base Width

6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

54 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 9 Rows = 2,917.1 cf Chamber Storage

7,251.6 cf Field - 2,917.1 cf Chambers = 4,334.5 cf Stone x 40.0% Voids = 1,733.8 cf Stone Storage

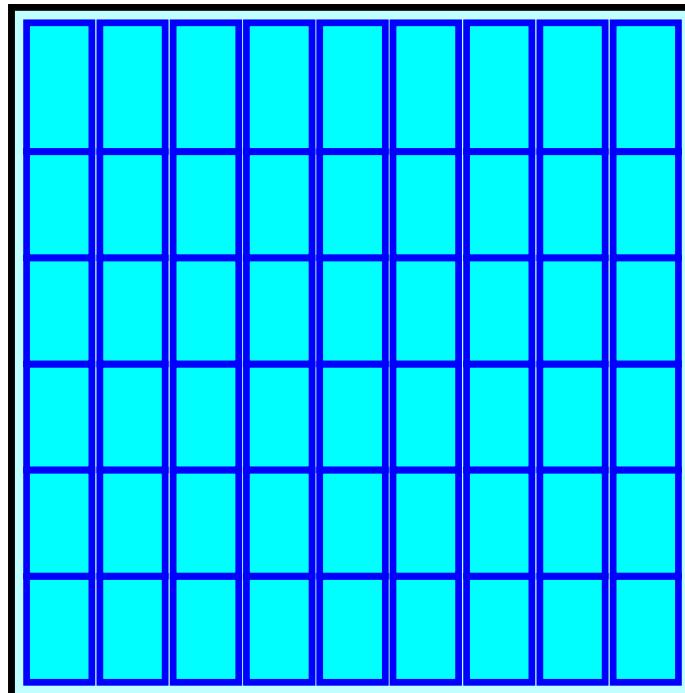
Chamber Storage + Stone Storage = 4,650.9 cf = 0.107 af

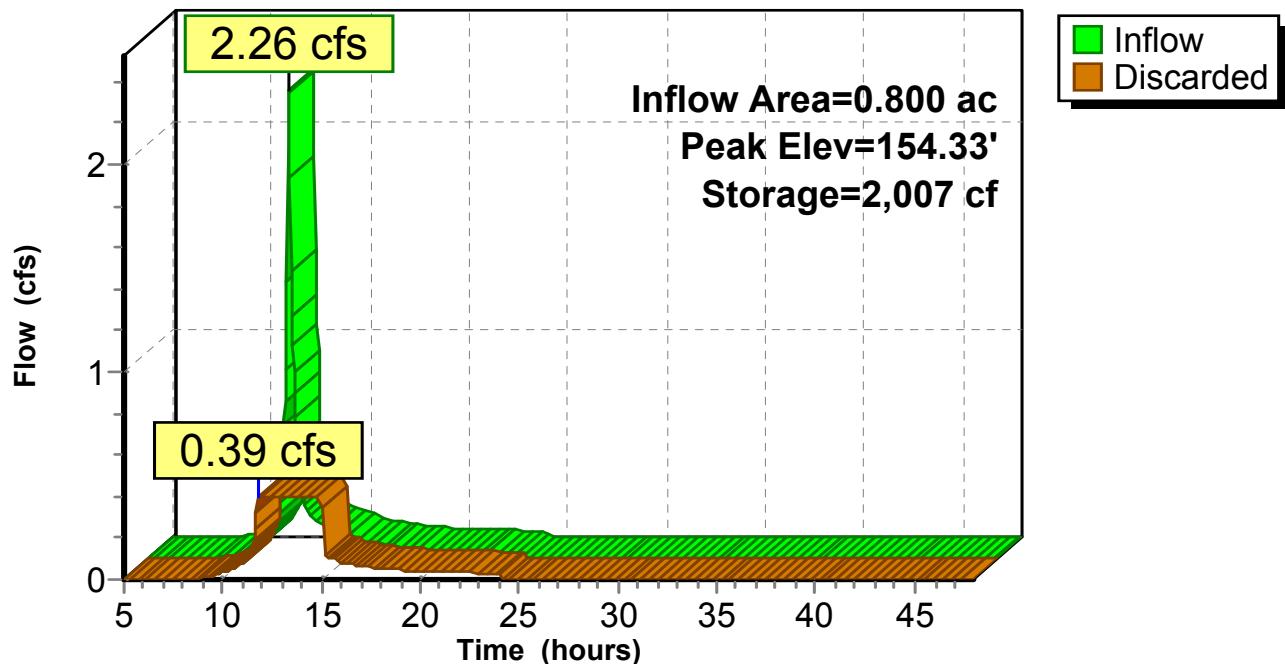
Overall Storage Efficiency = 64.1%

54 Chambers

268.6 cy Field

160.5 cy Stone



Pond 1P: Subsurface infiltration chambers**Hydrograph**

217-177 Post Development Final

Prepared by McKenzie Engineering Group, Inc.

HydroCAD® 10.00-14 s/n 00452 © 2015 HydroCAD Software Solutions LLC

*Type III 24-hr 25-Year Rainfall=5.50"*Page 22

Time span=5.00-48.00 hrs, dt=0.05 hrs, 861 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: 1SRunoff Area=78,349 sf 2.46% Impervious Runoff Depth=0.27"
Flow Length=650' Tc=17.3 min CN=38 Runoff=0.10 cfs 0.040 af**Subcatchment2S: 2S**Runoff Area=34,831 sf 63.83% Impervious Runoff Depth=3.14"
Tc=6.0 min CN=78 Runoff=2.89 cfs 0.209 af**Reach DP-1: PROPERTY LINE**Inflow=0.10 cfs 0.040 af
Outflow=0.10 cfs 0.040 af**Pond 1P: Subsurface infiltration chambers** Peak Elev=154.90' Storage=2,925 cf Inflow=2.89 cfs 0.209 af
Outflow=0.39 cfs 0.209 af**Total Runoff Area = 2.598 ac Runoff Volume = 0.250 af Average Runoff Depth = 1.15"**
78.65% Pervious = 2.044 ac 21.35% Impervious = 0.555 ac

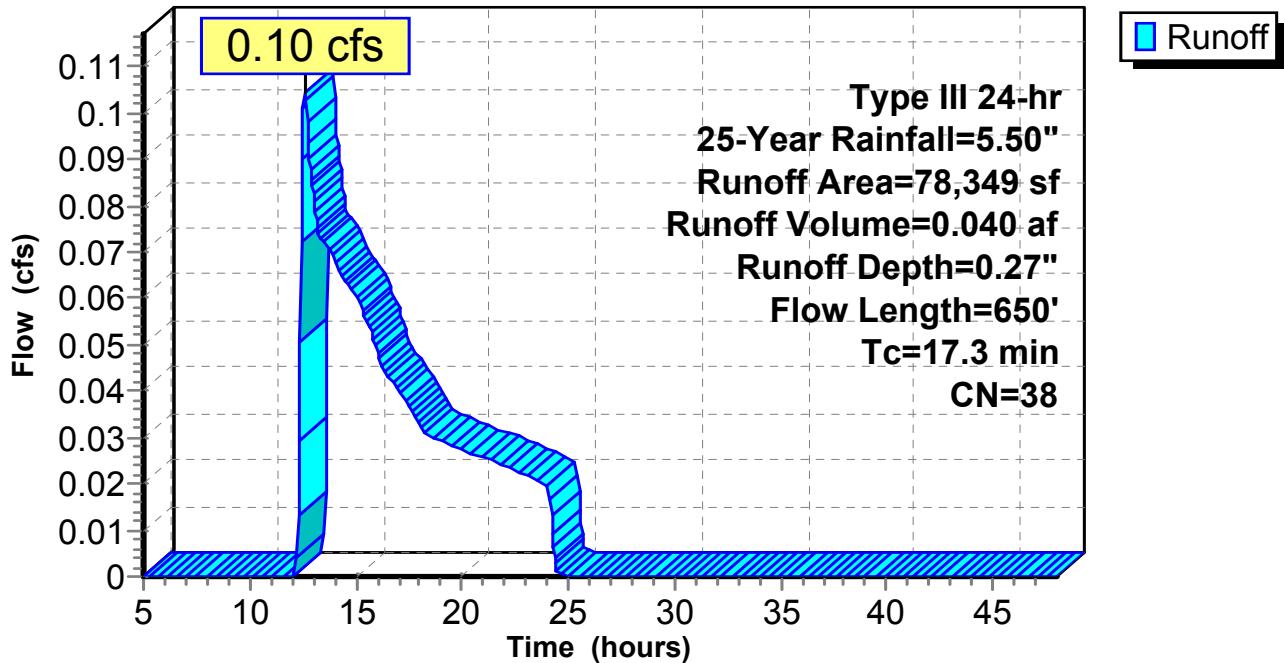
Summary for Subcatchment 1S: 1S

Runoff = 0.10 cfs @ 12.61 hrs, Volume= 0.040 af, Depth= 0.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
*	61,141	30 Woods, Good, HSG A (Offsite)
*	5,064	96 Gravel surface, HSG A (Offsite)
*	8,886	39 >75% Grass cover, Good, HSG A (Offsite)
*	1,742	98 Roofs, HSG A (Offsite)
	1,332	96 Gravel surface, HSG A
*	184	98 Concrete stairs, HSG A
78,349	38	Weighted Average
76,423		97.54% Pervious Area
1,926		2.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	50	0.0150	0.06		Sheet Flow, SHEET FLOW Woods: Light underbrush n= 0.400 P2= 3.20"
2.1	303	0.0230	2.44		Shallow Concentrated Flow, SHALLOW CONC. FLOW Unpaved Kv= 16.1 fps
1.4	297	0.0050	3.47	2.73	Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
17.3	650	Total			

Subcatchment 1S: 1S**Hydrograph**

Summary for Subcatchment 2S: 2S

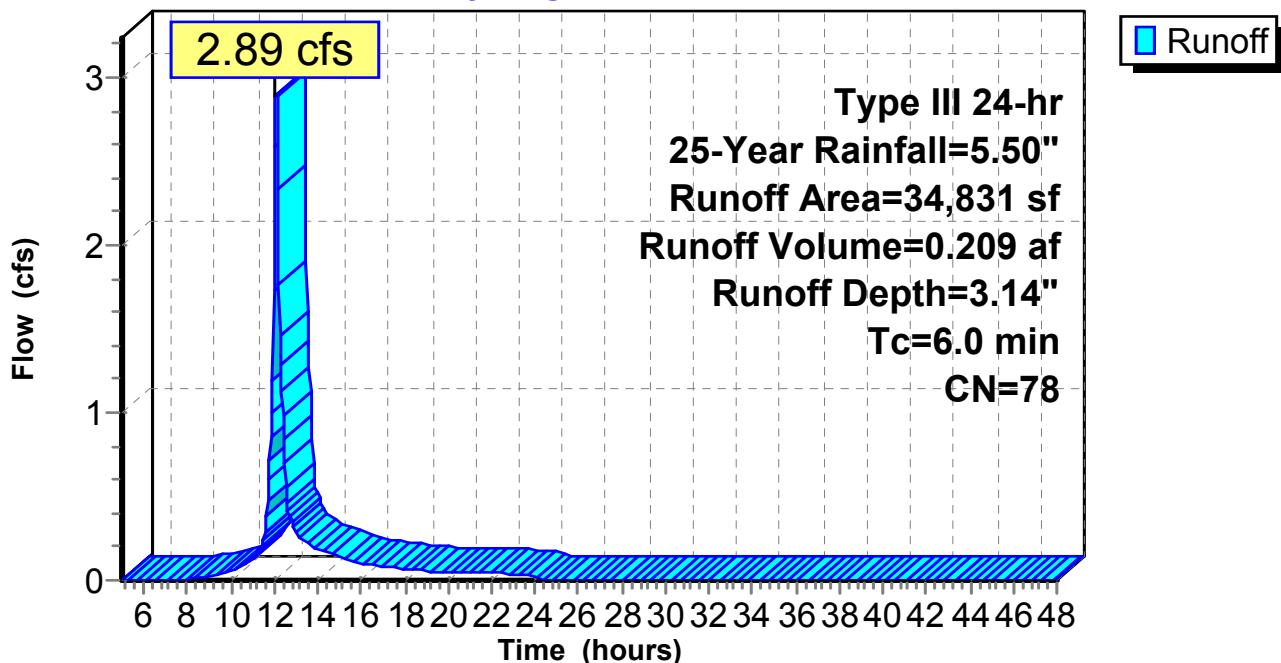
Runoff = 2.89 cfs @ 12.09 hrs, Volume= 0.209 af, Depth= 3.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description			
7,900	39	>75% Grass cover, Good, HSG A			
6,431	98	Paved parking, HSG A			
14,221	98	Roofs, HSG A			
*	252	Wall, HSG A			
*	1,329	Concrete walk, HSG A			
*	2,243	Permeable pavers, HSG A			
*	2,455	Planters, HSG A			
34,831	78	Weighted Average			
12,598		36.17% Pervious Area			
22,233		63.83% Impervious Area			
Tc	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 2S: 2S

Hydrograph



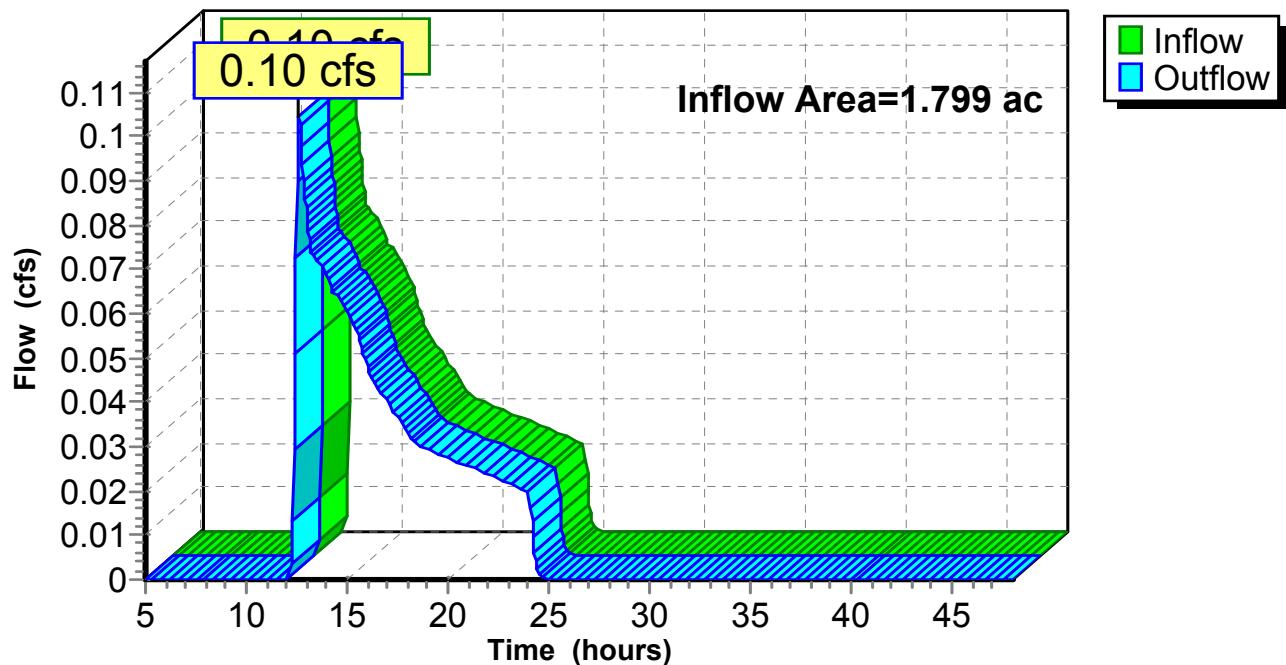
Summary for Reach DP-1: PROPERTY LINE

Inflow Area = 1.799 ac, 2.46% Impervious, Inflow Depth = 0.27" for 25-Year event
 Inflow = 0.10 cfs @ 12.61 hrs, Volume= 0.040 af
 Outflow = 0.10 cfs @ 12.61 hrs, Volume= 0.040 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-1: PROPERTY LINE

Hydrograph



Summary for Pond 1P: Subsurface infiltration chambers

Inflow Area = 0.800 ac, 63.83% Impervious, Inflow Depth = 3.14" for 25-Year event
 Inflow = 2.89 cfs @ 12.09 hrs, Volume= 0.209 af
 Outflow = 0.39 cfs @ 11.70 hrs, Volume= 0.209 af, Atten= 86%, Lag= 0.0 min
 Discarded = 0.39 cfs @ 11.70 hrs, Volume= 0.209 af

Routing by Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 154.90' @ 12.69 hrs Surf.Area= 2,048 sf Storage= 2,925 cf

Plug-Flow detention time= 53.8 min calculated for 0.209 af (100% of inflow)
 Center-of-Mass det. time= 53.7 min (876.6 - 822.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	152.90'	1,734 cf	45.00'W x 45.50'L x 3.54'H Field A 7,252 cf Overall - 2,917 cf Embedded = 4,334 cf x 40.0% Voids
#2A	153.40'	2,917 cf	Cultec R-330XLHD x 54 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 9 rows
4,651 cf			Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	152.90'	8.270 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.39 cfs @ 11.70 hrs HW=152.94' (Free Discharge)
 ↑ 1=Exfiltration (Exfiltration Controls 0.39 cfs)

Pond 1P: Subsurface infiltration chambers - Chamber Wizard Field A**Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)**

Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf

Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap

Row Length Adjustment= +1.50' x 7.45 sf x 9 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

6 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 43.50' Row Length +12.0" End Stone x 2 = 45.50'
Base Length

9 Rows x 52.0" Wide + 6.0" Spacing x 8 + 12.0" Side Stone x 2 = 45.00' Base Width

6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

54 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 9 Rows = 2,917.1 cf Chamber Storage

7,251.6 cf Field - 2,917.1 cf Chambers = 4,334.5 cf Stone x 40.0% Voids = 1,733.8 cf Stone Storage

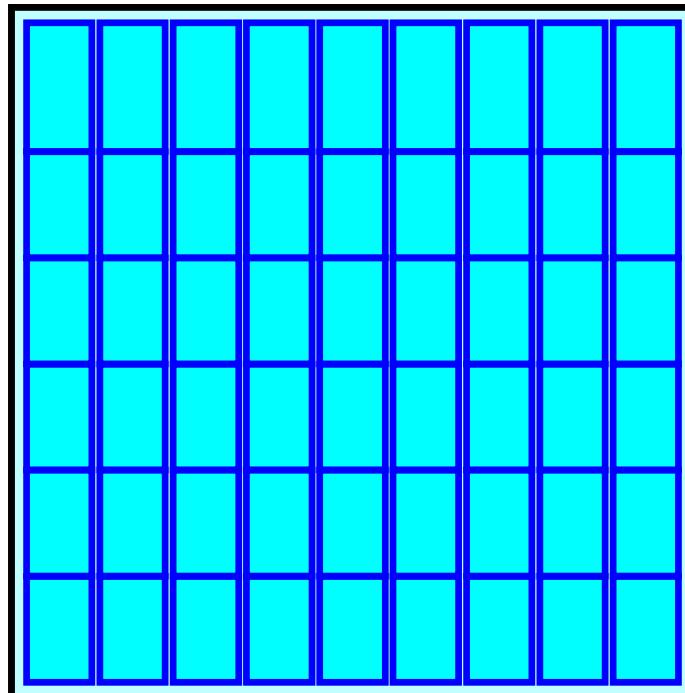
Chamber Storage + Stone Storage = 4,650.9 cf = 0.107 af

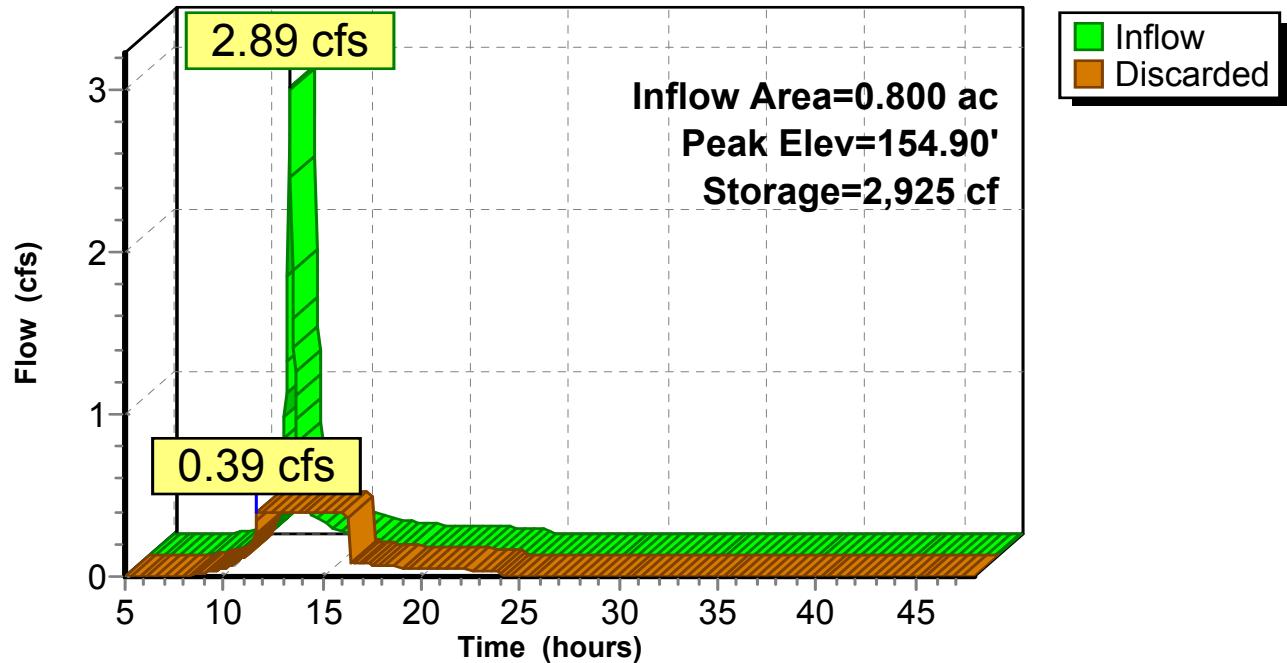
Overall Storage Efficiency = 64.1%

54 Chambers

268.6 cy Field

160.5 cy Stone



Pond 1P: Subsurface infiltration chambers**Hydrograph**

217-177 Post Development Final

Type III 24-hr 100-Year Rainfall=6.70"

Prepared by McKenzie Engineering Group, Inc.

HydroCAD® 10.00-14 s/n 00452 © 2015 HydroCAD Software Solutions LLC

Page 30

Time span=5.00-48.00 hrs, dt=0.05 hrs, 861 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: 1SRunoff Area=78,349 sf 2.46% Impervious Runoff Depth=0.60"
Flow Length=650' Tc=17.3 min CN=38 Runoff=0.43 cfs 0.090 af**Subcatchment2S: 2S**Runoff Area=34,831 sf 63.83% Impervious Runoff Depth=4.20"
Tc=6.0 min CN=78 Runoff=3.84 cfs 0.280 af**Reach DP-1: PROPERTY LINE**Inflow=0.43 cfs 0.090 af
Outflow=0.43 cfs 0.090 af**Pond 1P: Subsurface infiltration chambers** Peak Elev=156.20' Storage=4,450 cf Inflow=3.84 cfs 0.280 af
Outflow=0.39 cfs 0.280 af**Total Runoff Area = 2.598 ac Runoff Volume = 0.370 af Average Runoff Depth = 1.71"**
78.65% Pervious = 2.044 ac 21.35% Impervious = 0.555 ac

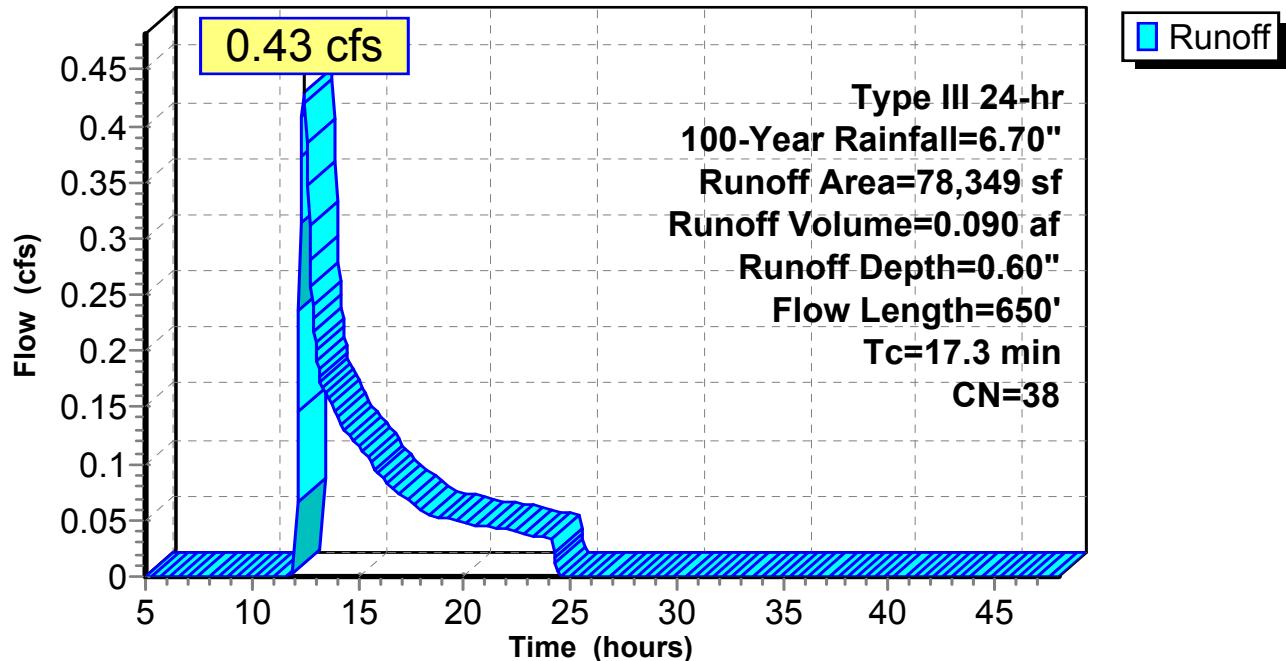
Summary for Subcatchment 1S: 1S

Runoff = 0.43 cfs @ 12.48 hrs, Volume= 0.090 af, Depth= 0.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.70"

Area (sf)	CN	Description
*	61,141	30 Woods, Good, HSG A (Offsite)
*	5,064	96 Gravel surface, HSG A (Offsite)
*	8,886	39 >75% Grass cover, Good, HSG A (Offsite)
*	1,742	98 Roofs, HSG A (Offsite)
	1,332	96 Gravel surface, HSG A
*	184	98 Concrete stairs, HSG A
78,349	38	Weighted Average
76,423		97.54% Pervious Area
1,926		2.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	50	0.0150	0.06		Sheet Flow, SHEET FLOW Woods: Light underbrush n= 0.400 P2= 3.20"
2.1	303	0.0230	2.44		Shallow Concentrated Flow, SHALLOW CONC. FLOW Unpaved Kv= 16.1 fps
1.4	297	0.0050	3.47	2.73	Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
17.3	650	Total			

Subcatchment 1S: 1S**Hydrograph**

Summary for Subcatchment 2S: 2S

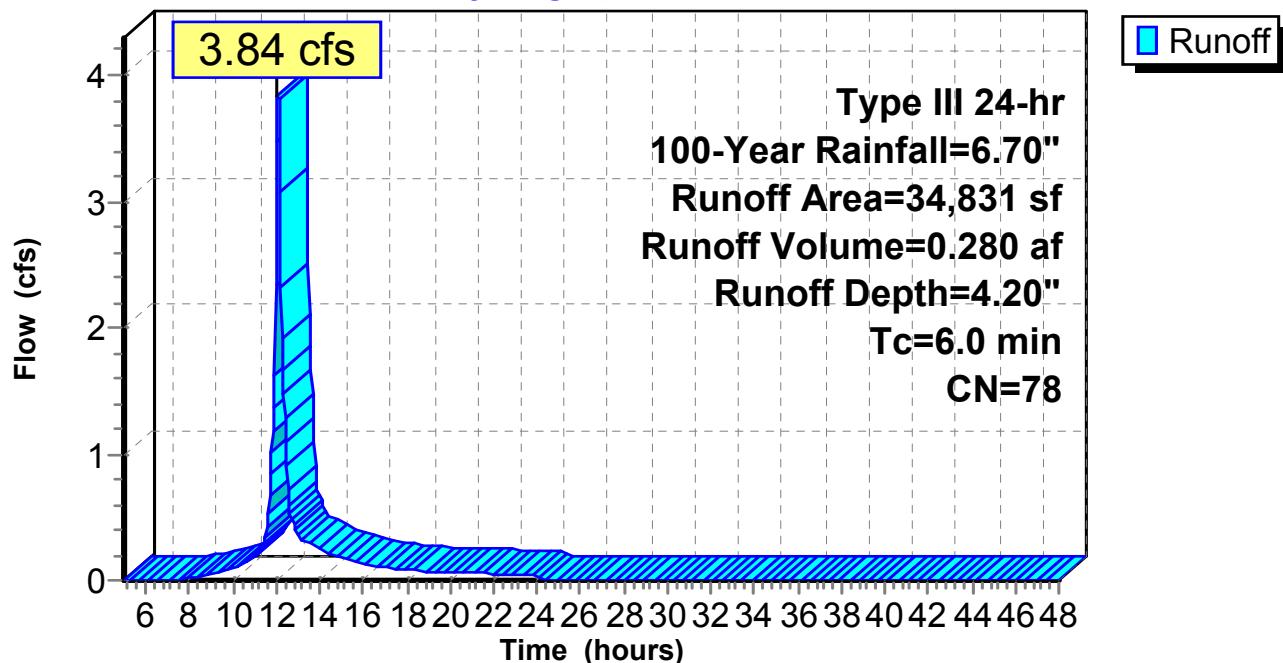
Runoff = 3.84 cfs @ 12.09 hrs, Volume= 0.280 af, Depth= 4.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.70"

Area (sf)	CN	Description			
7,900	39	>75% Grass cover, Good, HSG A			
6,431	98	Paved parking, HSG A			
14,221	98	Roofs, HSG A			
*	252	Wall, HSG A			
*	1,329	Concrete walk, HSG A			
*	2,243	Permeable pavers, HSG A			
*	2,455	Planters, HSG A			
34,831	78	Weighted Average			
12,598		36.17% Pervious Area			
22,233		63.83% Impervious Area			
Tc	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 2S: 2S

Hydrograph



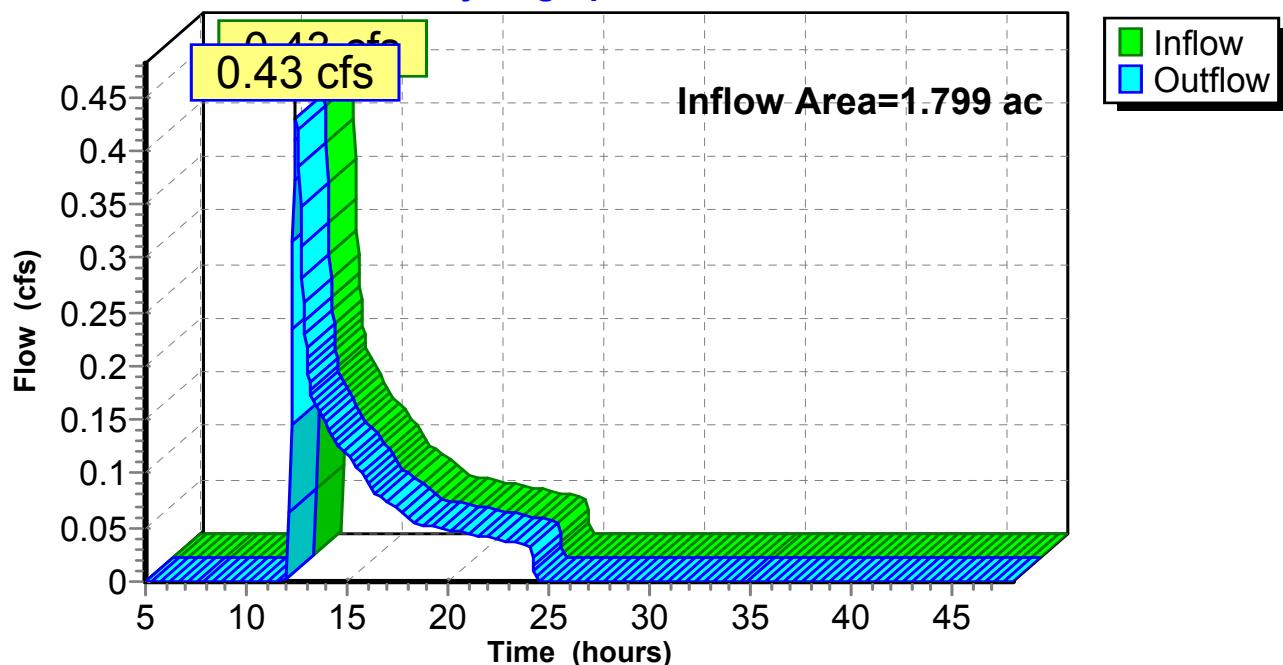
Summary for Reach DP-1: PROPERTY LINE

Inflow Area = 1.799 ac, 2.46% Impervious, Inflow Depth = 0.60" for 100-Year event

Inflow = 0.43 cfs @ 12.48 hrs, Volume= 0.090 af

Outflow = 0.43 cfs @ 12.48 hrs, Volume= 0.090 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-1: PROPERTY LINE**Hydrograph**

Summary for Pond 1P: Subsurface infiltration chambers

Inflow Area = 0.800 ac, 63.83% Impervious, Inflow Depth = 4.20" for 100-Year event
 Inflow = 3.84 cfs @ 12.09 hrs, Volume= 0.280 af
 Outflow = 0.39 cfs @ 11.65 hrs, Volume= 0.280 af, Atten= 90%, Lag= 0.0 min
 Discarded = 0.39 cfs @ 11.65 hrs, Volume= 0.280 af

Routing by Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 156.20' @ 12.95 hrs Surf.Area= 2,048 sf Storage= 4,450 cf

Plug-Flow detention time= 90.0 min calculated for 0.280 af (100% of inflow)
 Center-of-Mass det. time= 89.9 min (904.5 - 814.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	152.90'	1,734 cf	45.00'W x 45.50'L x 3.54'H Field A 7,252 cf Overall - 2,917 cf Embedded = 4,334 cf x 40.0% Voids
#2A	153.40'	2,917 cf	Cultec R-330XLHD x 54 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 9 rows
4,651 cf			Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	152.90'	8.270 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.39 cfs @ 11.65 hrs HW=152.95' (Free Discharge)
 ↑ 1=Exfiltration (Exfiltration Controls 0.39 cfs)

Pond 1P: Subsurface infiltration chambers - Chamber Wizard Field A**Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)**

Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf

Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap

Row Length Adjustment= +1.50' x 7.45 sf x 9 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

6 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 43.50' Row Length +12.0" End Stone x 2 = 45.50' Base Length

9 Rows x 52.0" Wide + 6.0" Spacing x 8 + 12.0" Side Stone x 2 = 45.00' Base Width

6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

54 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 9 Rows = 2,917.1 cf Chamber Storage

7,251.6 cf Field - 2,917.1 cf Chambers = 4,334.5 cf Stone x 40.0% Voids = 1,733.8 cf Stone Storage

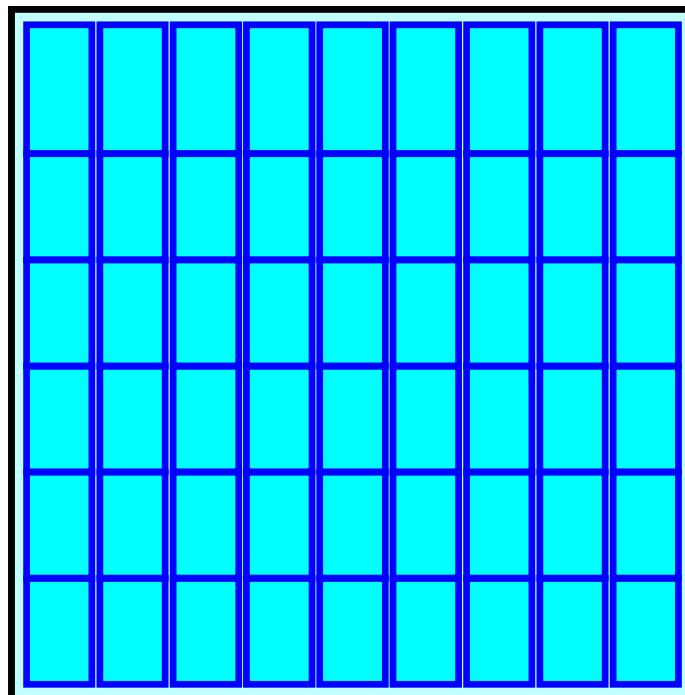
Chamber Storage + Stone Storage = 4,650.9 cf = 0.107 af

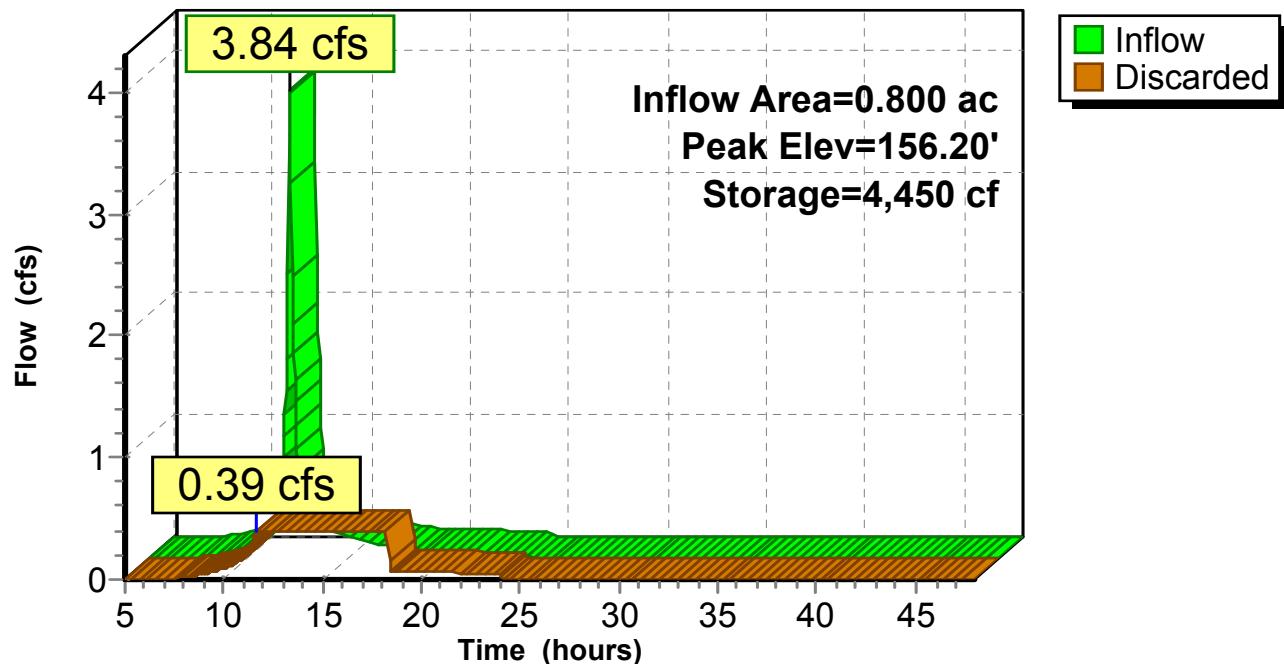
Overall Storage Efficiency = 64.1%

54 Chambers

268.6 cy Field

160.5 cy Stone



Pond 1P: Subsurface infiltration chambers**Hydrograph**

A P P E N D I X C

Soil Testing Data



Commonwealth of Massachusetts
City/Town of Wellesley
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Wellesley Park, LLC	Owner Name	149 - 4
148 Weston Road	Street Address	Map/Lot #
Wellesley	City	02482
	State	Zip Code

B. Site Information

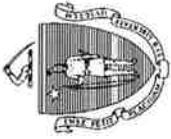
1. (Check one) <input checked="" type="checkbox"/> New Construction	<input type="checkbox"/> Upgrade	<input type="checkbox"/> Repair
2. Soil Survey Available? <input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	If yes: <u>Web Soil Survey</u> <u>Source</u>
Merrimac fine sandy loam		
Soil Name	No major limitations for site development	
Outwash	Soil Limitations	
Geologic/Parent Material		
3. Surficial Geological Report Available? <input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Landform If yes: <u>1974</u> <u>Year Published/Source</u>
4. Flood Rate Insurance Map	<input type="checkbox"/> No	1:24,000 <u>Publication Scale</u>
Within the 100-year flood boundary? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
If Yes, continue to #5.		
5. Within a velocity zone?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
6. Within a Mapped Wetland Area?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
7. Current Water Resource Conditions (USGS):	Jan. 2018 Month/Year	Range: <input type="checkbox"/> Above Normal <input checked="" type="checkbox"/> Normal <input type="checkbox"/> Below Normal Wetland Type
8. Other references reviewed:		



Commonwealth of Massachusetts
City/Town of Wellesley
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number:	TP-1	Date	1/31/18	Time	8:30 AM	<u>Sunny 28 degrees</u>	Weather
1. Location							
Ground Elevation at Surface of Hole:	155.7+/- feet	Latitude/Longitude:	42 17'49.9" / 71 18'5.6"				
Description of Location:							
2. Land Use	Vacant lot (e.g., woodland, agricultural field, vacant lot, etc.)	Landform	Common Surface Stones (e.g., cobbles, stones, boulders, etc.)	3-5% Slope (%)			
Pine, oak, maple Vegetation	Open Water Body	>100' feet	Drainage Way	>100' feet	Position on Landscape (SU, SH, BS, FS, TS) Wetlands	>100' feet	
Distances from:	Property Line	40+/- feet	Drinking Water Well	>100' feet	Other		
4. Parent Material:	Outwash		Unsuitable Materials Present:	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No		
If Yes:	<input type="checkbox"/> Disturbed Soil	<input type="checkbox"/> Fill Material	<input type="checkbox"/> Impervious Layer(s)	<input type="checkbox"/> Weathered/Fractured Rock	<input type="checkbox"/> Bedrock		
5. Groundwater Observed:	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	If yes:	Depth Weeping from Pit	Depth Standing Water in Hole		
Estimated Depth to High Groundwater:	>100" inches		<147.4+/- elevation				



**Commonwealth of Massachusetts
City/Town of Wellesley**

Form 11 - Soil Suitability A

C. On-Site Review (continued)

Deep Observation Hole Number:

TP-1

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume	Soil Structure	Consistence (Moist)	Other
			Depth	Color	Percent				
0"-56"	F					Fill			
56"-100"	C1	10YR4/6			0%	Sand	5-10%	<5%	Single grain Loose Medium

Additional Notes:

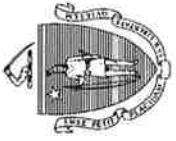
Commonwealth of Massachusetts
City/Town of Wellesley



Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number:	TP-2	Date	1/31/18	Time	9:15 AM	Sunny 28 degrees	Weather		
1. Location									
Ground Elevation at Surface of Hole:	146.0+/- feet	Latitude/Longitude: 42° 17'49.4" / 71° 18'5.6"							
2. Land Use	Vacant lot (e.g. woodland, agricultural field, vacant lot, etc.)	Common Surface Stones (e.g., cobbles, stones, boulders, etc.)							
Vegetation	Pine, oak, maple	Landform	Position on Landscape (SU, SH, BS, FS, Wetlands >100' feet)						
3. Distances from:	Open Water Body >100' feet	Drainage Way >100' feet	>100' feet						
Property Line	20'+/- feet	Drinking Water Well >100' feet	Other feet						
4. Parent Material:	Outwash	Unsuitable Materials Present:							
If Yes:	<input type="checkbox"/> Disturbed Soil	<input type="checkbox"/> Fill Material	<input type="checkbox"/> Impervious Layer(s)	<input type="checkbox"/> Weathered/Fractured Rock	<input type="checkbox"/> Bedrock				
5. Groundwater Observed:	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	If yes:	<u>Depth Weeping from Pit</u>		<u>Depth Standing Water in Hole</u>			
Estimated Depth to High Groundwater:	>92" inches		<138.3+/- elevation						



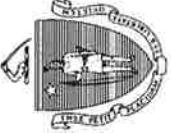
Commonwealth of Massachusetts City/Town of Wellesley Form 11 - Soil Suitability /

C. On-Site Review (continued)

Deep Observation Hole Number:

TP-2

Additional Notes:



**Commonwealth of Massachusetts
City/Town of Wellesley**

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

- Depth observed standing water in observation hole
- Depth weeping from side of observation hole
- Depth to soil redoximorphic features (mottles)
- Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)

Index Well Number	Reading Date	Obs. Hole #	S_c	S_r	OW_c	OW_{max}	OW_r	S_h

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

- a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

Yes No

- b. If yes, at what depth was it observed?

Upper boundary: _____ inches
Lower boundary: _____ inches

- c. If no, at what depth was impervious material observed?

Upper boundary: _____ inches
Lower boundary: _____ inches



Commonwealth of Massachusetts
City/Town of Wellesley

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Board of Health Witness

Name of Board of Health Witness	Board of Health
Soil Evaluator Certification	
<p>I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.</p>	
	
Signature of Soil Evaluator	Jan. 31, 2018
Type or Printed Name of Soil Evaluator / License #	Alan W. Loomis, Soil Evaluator #1405
Date	June 30, 2019
Expiration Date of License	Exhibit A

G. Soil Evaluator Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

Chionanthus

Signature of Soil Evaluator

Alan W. Loomis, Soil Evaluator #1405

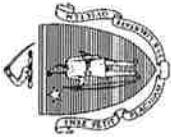
Typed or Printed Name of Soil Evaluator / License #

Typed or Printed Name of Soil Evaluator / License #

Typed or Printed Name of Soil Evaluator / License #

Note: In accordance with 3:10 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Commonwealth of Massachusetts
City/Town of Wellesley
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal



Field Diagrams

Use this sheet for field diagrams:

**Commonwealth of Massachusetts
City/Town of Wellesley**
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

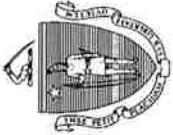


A. Facility Information

Wellesley Park, LLC	149 - 4
Owner Name	Map/Lot #
148 Weston Road	02482
Street Address	Zip Code
Wellesley	
City	

B. Site Information

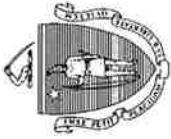
1. (Check one) New Construction Upgrade Repair
2. Soil Survey Available? Yes No If yes: Web Soil Survey
Source 254B
Soil Map Unit
3. Surficial Geological Report Available? Yes No If yes: 1974
Year Published/Source Qlc4
Map Unit
4. Flood Rate Insurance Map
Above the 500-year flood boundary? Yes No Within the 100-year flood boundary? Yes No
If Yes, continue to #5.
5. Within a velocity zone? Yes No
6. Within a Mapped Wetland Area? Yes No MassGIS Wetland Data Layer: _____
7. Current Water Resource Conditions (USGS): Jan. 2018
Month/Year Range: Above Normal Normal Below Normal Wetland Type: _____
8. Other references reviewed: _____



Commonwealth of Massachusetts
City/Town of Wellesley
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number:	TP-3	Date	1/31/18	Time	10:00 AM	Weather	Sunny 28 degrees
1. Location							
Ground Elevation at Surface of Hole:	146.9+/- feet	Latitude/Longitude:	42 17'49.1" / 71 18'6.0"				
Description of Location:							
2. Land Use	Vacant lot (e.g., woodland, agricultural field, vacant lot, etc.)	Landform	Common Surface Stones (e.g., cobbles, stones, boulders, etc.)	Position on Landscape (SU, SH, BS, FS, TS)	3-5% Slope (%)		
Pine, oak, maple	Vegetation	Drainage Way	>100' feet	Wetlands	>100' feet		
3. Distances from:	Open Water Body	>100' feet		Other	>100' feet		
Property Line	20+/- feet	Drinking Water Well					
4. Parent Material:	Outwash	Unsuitable Materials Present:					<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
If Yes:	<input type="checkbox"/> Disturbed Soil	<input type="checkbox"/> Fill Material	<input type="checkbox"/> Impervious Layer(s)	<input type="checkbox"/> Weathered/Fractured Rock	<input type="checkbox"/> Bedrock		
5. Groundwater Observed:	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	If yes:	Depth Weeping from Pit	Depth Standing Water in Hole		
Estimated Depth to High Groundwater:	>96" inches		<138.9+/- elevation				



Commonwealth of Massachusetts
City/Town of Wellesley

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number:

TP-3

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume	Soil Structure	Consistence (Moist)	Other
			Depth	Color	Percent				
0"-8"	Ap	10YR3/2			0%	Sandy loam	10-15%	Granular	Friable
8"-15"	Bw	7.5YR3/4			0%	Sand	40%	Single grain	Loose
15"-38"	C1	10YR3/4			0%	Sand	40%	Single grain	Loose
38"-96"	C2	2.5Y4/4			0%	Loamy sand	25-30%	Granular	Friable, firm in pl.

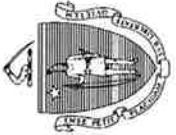
Additional Notes:



Commonwealth of Massachusetts
City/Town of Wellesley
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number:	TP-4	Date	1/31/18	Time	10:45 AM	Sunny 30 degrees	Weather
1. Location							
Ground Elevation at Surface of Hole:	149.4+/- feet	Latitude/Longitude:	42 17'48.9" / 71 18'6.2"				
2. Land Use	Vacant lot (e.g. woodland, agricultural field, vacant lot, etc.)	Common Surface Stones (e.g., cobbles, stones, boulders, etc.)	3-5% Slope (%)				
Vegetation	Pine, oak, maple	Landform	Drainage Way	>100' feet	Position on Landscape (SU, SH, BS, FS, Wetlands >100' feet)		
3. Distances from:	Open Water Body >100' feet	Property Line 20+/- feet	Drinking Water Well >100' feet	Other feet			
4. Parent Material:	Outwash	Unsuitable Materials Present:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No				
If Yes:	<input type="checkbox"/> Disturbed Soil	<input type="checkbox"/> Fill Material	<input type="checkbox"/> Impervious Layer(s)	<input type="checkbox"/> Weathered/Fractured Rock	<input type="checkbox"/> Bedrock		
5. Groundwater Observed:	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	If yes: Estimated Depth to High Groundwater: >96" inches	Depth Weeping from Pit <14.4+/- elevation	Depth Standing Water in Hole		



**Commonwealth of Massachusetts
City/Town of Wellesley**

Form 11 - Soil Suitability A

C. On-Site Review (continued)

Deep Observation Hole Number:

TP-4

Additional Notes:

**Commonwealth of Massachusetts
City/Town of Wellesley**
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal



D. Determination of High Groundwater Elevation

1. Method Used:
 - Depth observed standing water in observation hole
 - Depth weeping from side of observation hole
 - Depth to soil redoximorphic features (mottles)
 - Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)

Index Well Number	Reading Date	Obs. Hole # TP-3	Obs. Hole # TP-4
		>96"	>96"
		inches	inches

$$S_h = S_c - [S_r \times (OW_c - OW_{max}) / OW_r]$$

Obs. Hole #	<u>S_c</u>	<u>S_r</u>	<u>OW_c</u>	<u>OW_{max}</u>	<u>OW_r</u>	<u>S_h</u>
Obs. Hole #	<u>S_c</u>	<u>S_r</u>	<u>OW_c</u>	<u>OW_{max}</u>	<u>OW_r</u>	<u>S_h</u>

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material
 - a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?
 - Yes
 - No
 - b. If yes, at what depth was it observed?
 - c. If no, at what depth was impervious material observed?
- | | | | |
|-----------------|--------|-----------------|--------|
| Upper boundary: | inches | Lower boundary: | inches |
| Upper boundary: | inches | Lower boundary: | inches |



Commonwealth of Massachusetts City/Town of Wellesley

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Board of Health Witness

Name of Board of Health Witness	Board of Health
Soil Evaluator Certification	
<p>I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.</p>	
	
Signature of Soil Evaluator	Jan. 31, 2018
Type or Printed Name of Soil Evaluator / License #	Alan W. Loomis, Soil Evaluator #1405
Date	June 30, 2019
Expiration Date of License	Expirs 06-30-2019

G. Soil Evaluator Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

Dr. W. Howin

Signature of Soil Evaluator

Alan W. Loomis Soil Evaluator #1405

Typed or Printed Name of Soil Evaluator / License #

Jan. 31, 2018
Date
June 30, 2019
Expiration Date of License

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

**Commonwealth of Massachusetts
City/Town of Wellesley**
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal



Field Diagrams

Use this sheet for field diagrams:

Commonwealth of Massachusetts
City/Town of Wellesley
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal



A. Facility Information

Wellesley Park, LLC	149 - 4
Owner Name	Map/Lot #
148 Weston Road	02482
Street Address	Zip Code
Wellesley	
MA	
State	
City	

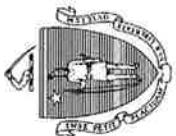
B. Site Information

1. (Check one) New Construction Upgrade Repair
2. Soil Survey Available? Yes No If yes: Web Soil Survey
Source 254B
Soil Map Unit
Merrimac fine sandy loam
Soil Name
Outwash
Geologic/Parent Material
3. Surficial Geological Report Available? Yes No Landform
If yes: 1974 Qlc4
Year Published/Source Publication Scale
Map Unit
4. Flood Rate Insurance Map
Above the 500-year flood boundary? Yes No Within the 100-year flood boundary? Yes No
If Yes, continue to #5.
5. Within a velocity zone? Yes No
6. Within a Mapped Wetland Area? Yes No MassGIS Wetland Data Layer: _____
Wetland Type _____
7. Current Water Resource Conditions (USGS): Jan. 2018
Month/Year Above Normal Normal Below Normal
8. Other references reviewed: _____

Commonwealth of Massachusetts
City/Town of Wellesley
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal



C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)						
Deep Observation Hole Number:	TP-5	<u>Date</u>	1/31/18	<u>Time</u>	11:15 AM	
1. Location						
Ground Elevation at Surface of Hole:	157.2+/- feet	Latitude/Longitude: 42 17'50.5" / 71 18'5.3"				
Description of Location:						
2. Land Use	Vacant lot (e.g., woodland, agricultural field, vacant lot, etc.) Pine, oak, maple	Landform	Common Surface Stones (e.g., cobbles, stones, boulders, etc.)	Position on Landscape (SU, SH, BS, FS, TS) Slope (%)		
Distances from:	Open Water Body	Drainage Way	>100' feet	Wetlands	>100' feet	
	Property Line	Drinking Water Well	>100' feet	Other	>100' feet	
4. Parent Material:	<u>Outwash</u>	Unsuitable Materials Present:			<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
If Yes:	<input type="checkbox"/> Disturbed Soil <input type="checkbox"/> Fill Material <input type="checkbox"/> Impervious Layer(s)				<input type="checkbox"/> Weathered/Fractured Rock <input type="checkbox"/> Bedrock	
5. Groundwater Observed:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes:	<u>Depth Weeping from Pit</u>	<u>Depth Standing Water in Hole</u>		
Estimated Depth to High Groundwater:	>106" inches		<148.4+/- elevation			



Commonwealth of Massachusetts City/Town of Wellesley Form 11 - Soil Suitability /

C. On-Site Review (continued)

Deep Observation Hole Number:

TP-5

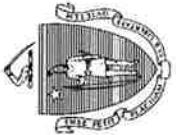
Additional Notes:



Commonwealth of Massachusetts
City/Town of Wellesley
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number:	TP-6	Date	1/31/18	Time	11:45 AM	Weather	Sunny 30 degrees
1. Location							
Ground Elevation at Surface of Hole:	157.7+/- feet	Latitude/Longitude:			42 17'50.8" / 71 18'4.9"		
2. Land Use	Vacant lot (e.g., woodland, agricultural field, vacant lot, etc.)	Common	Surface Stones (e.g., cobbles, stones, boulders, etc.)			Slope (%)	
Vegetation	Pine, oak, maple	Landform	Drainage Way	>100' feet	Position on Landscape (SU, SH, BS, FS, Wetlands >100' feet)		
3. Distances from:	Open Water Body	>100' feet	Drinking Water Well	>100' feet	Other		
Property Line	25+/- feet						
4. Parent Material:	Outwash	Unsuitable Materials Present:			<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
If Yes:	<input type="checkbox"/> Disturbed Soil	<input type="checkbox"/> Fill Material	<input type="checkbox"/> Impervious Layer(s)	<input type="checkbox"/> Weathered/Fractured Rock	<input type="checkbox"/> Bedrock		
5. Groundwater Observed:	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	If yes:	Depth Weeping from Pit	Depth Standing Water in Hole		
Estimated Depth to High Groundwater:	>106" inches	<148.9+/- elevation					



**Commonwealth of Massachusetts
City/Town of Wellesley
Form 11 - Soil Suitability /**

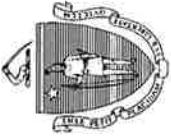
C. On-Site Review (continued)

Deep Observation Hole Number:

TP-6

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume	Soil Structure	Consistence (Moist)	Other
			Depth	Color	Percent				
0"-27"	F					Fill			
27"-106"	C1	2.5Y4/4		0%	Sand	20-25%	15%	Single grain Loose	Coarse

Additional Notes:



Commonwealth of Massachusetts
City/Town of Wellesley
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:
- Depth observed standing water in observation hole
- Depth weeping from side of observation hole
- Depth to soil redoximorphic features (mottles)
- Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)

Index Well Number	Reading Date	Obs. Hole # TP-5	Obs. Hole # TP-6
$S_h = S_c - [S_r \times (OW_c - OW_{max})/OW_r]$		S_c _____ inches	S_r _____ inches
		OW_c _____ inches	OW_{max} _____ inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material
- a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?
- Yes No
- b. If yes, at what depth was it observed?
- c. If no, at what depth was impervious material observed?
- Upper boundary: _____ inches Lower boundary: _____ inches
- Upper boundary: _____ inches Lower boundary: _____ inches
- Upper boundary: _____ inches Lower boundary: _____ inches



**Commonwealth of Massachusetts
City/Town of Wellesley
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal**

F. Board of Health Witness

Name of Board of Health Witness _____

Board of Health _____

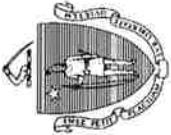
G. Soil Evaluator Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

	Jan. 31, 2018
Signature of Soil Evaluator	Date
Alan V. Loomis, Soil Evaluator # 1405	June 30, 2019
Typed or Printed Name of Soil Evaluator / License #	Expiration Date of License

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

**Commonwealth of Massachusetts
City/Town of Wellesley**
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal



Field Diagrams

Use this sheet for field diagrams:



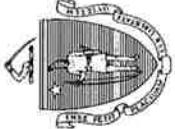
Commonwealth of Massachusetts
City/Town of Wellesley
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Wellesley Park, LLC	149 - 4 Map/Lot #
Owner Name	Street Address
148 Weston Road	02482 Zip Code
Wellesley	MA State
City	

B. Site Information

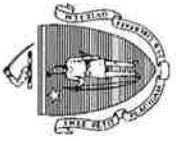
1. (Check one) New Construction Upgrade Repair
2. Soil Survey Available? Yes No If yes: Web Soil Survey
Source 254B
Soil Name Merrimac fine sandy loam
Soil Limitations No major limitations for site development
Soil Map Unit
3. Surficial Geological Report Available? Yes No If yes: 1974
Geologic/Parent Material Outwash
Year Published/Source Qlc4
Publication Scale 1:24,000
Map Unit
4. Flood Rate Insurance Map
Above the 500-year flood boundary? Yes No Within the 100-year flood boundary? Yes No
If Yes, continue to #5.
5. Within a velocity zone? Yes No
6. Within a Mapped Wetland Area? Yes No MassGIS Wetland Data Layer: Wetland Type
7. Current Water Resource Conditions (USGS): Jan. 2018
Month/Year Range: Above Normal Normal Below Normal
8. Other references reviewed: _____



Commonwealth of Massachusetts
City/Town of Wellesley
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number:	TP-7	Date	1/31/18	Time	12:20 PM	Sunny 30 degrees	Weather
1. Location							
Ground Elevation at Surface of Hole:	158.1+/- feet	Latitude/Longitude:	42 17'51.1" / 71 18'4.3"				
Description of Location:							
2. Land Use	Vacant lot (e.g., woodland, agricultural field, vacant lot, etc.) Pine, oak, maple	Landform	Common Surface Stones (e.g., cobbles, stones, boulders, etc.)	Slope (%)	1-3%		
3. Distances from:	Vegetation Open Water Body Property Line	Drainage Way >100' feet 25+/- feet	Position on Landscape (SU, SH, BS, FS, TS) Wetlands Other	>100' feet >100' feet	>100' feet	>100' feet	
4. Parent Material:	Outwash	Unsuitable Materials Present:		<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No		
If Yes:	<input type="checkbox"/> Disturbed Soil <input type="checkbox"/> Yes	<input type="checkbox"/> Fill Material <input type="checkbox"/> No	<input type="checkbox"/> Impervious Layer(s)	<input type="checkbox"/> Weathered/Fractured Rock	<input type="checkbox"/> Bedrock		
5. Groundwater Observed:			If yes:	Depth Weeping from Pit <149.3+/- elevation	Depth Standing Water in Hole		
Estimated Depth to High Groundwater:	>106" inches						



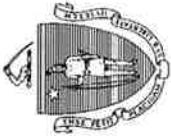
**Commonwealth of Massachusetts
City/Town of Wellesley
Form 11 - Soil Suitability /**

C. On-Site Review (continued)

Deep Observation Hole Number:

TP-7

Additional Notes:



**Commonwealth of Massachusetts
City/Town of Wellesley**
Form 11 - Soil Suitability /

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number:

Location

Ground Elevation at Surface of Hole:

2 | and | see

(e.g., woodland, agricultural, etc.)

3 Distances from: Vegetation Open Water Body

Property Line

4. Parent Material:

If Yes: Disturbed Soil

5. Groundwater Observed: Yes

Estimated Depth to High Groundwater:

C. On-Site Review (continued)	
Deep Observation Hole Number:	Date _____
1. Location	Time _____
Ground Elevation at Surface of Hole:	Latitude/Longitude: _____ / _____
2. Land Use (e.g., woodland, agricultural field, vacant lot, etc.)	Surface Stones (e.g., cobbles, stones, boulders, etc.) Position on Landscape (SU, SH, BS, FS, Wetlands) feet
3. Distances from: Vegetation	Landform feet
Open Water Body	Drainage Way feet
Property Line	Drinking Water Well feet
4. Parent Material:	Unsuitable Materials Present: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
If Yes: 5. Groundwater Observed:	<input type="checkbox"/> Disturbed Soil <input type="checkbox"/> Fill Material <input type="checkbox"/> Impervious Layer(s) <input type="checkbox"/> Yes <input type="checkbox"/> No
Estimated Depth to High Groundwater:	feet
If yes: 5. Depth Weeping from Pit	elevation _____
Depth Standing Water in Hole	feet
If Yes: 5. Weathered/Fractured Rock <input type="checkbox"/> Bedrock	



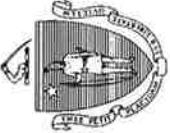
Commonwealth of Massachusetts City/Town of Wellesley

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number:

Additional Notes:



Commonwealth of Massachusetts
City/Town of Wellesley
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:
- Depth observed standing water in observation hole
- Depth weeping from side of observation hole
- Depth to soil redoximorphic features (mottles)
- Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)

Index Well Number	Reading Date	Obs. Hole #	$T\bar{P}-7$	Obs. Hole #
			>106"	
			inches	inches

$S_h = S_c - [S_r \times (OW_c - OW_{max})/OW_r]$				
Obs. Hole #	S_c —	S_r —	OW_c —	OW_{max} —
Obs. Hole #	S_c —	S_r —	OW_c —	OW_{max} —

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material
- a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?
- Yes No
- b. If yes, at what depth was it observed?
- c. If no, at what depth was impervious material observed?

Upper boundary: inches Lower boundary: inches

Upper boundary: inches Lower boundary: inches



**Commonwealth of Massachusetts
City/Town of Wellesley
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal**

F. Board of Health Witness

Name of Board of Health Witness _____ Board of Health

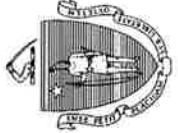
G. Soil Evaluator Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

	Jan. 31, 2018
Signature of Soil Evaluator	Date
Alan V. Loomis, Soil Evaluator #1405	June 30, 2019
Typed or Printed Name of Soil Evaluator / License #	Expiration Date of License

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

**Commonwealth of Massachusetts
City/Town of Wellesley**



Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

Field Diagrams

Use this sheet for field diagrams: